Highlighted Version Documenting Changes to the

MINIMUM STANDARD SPECIFICATIONS FOR STREETS

City of Bryant, Arkansas

August 2021

LEGEND

TEXT = Text that was added

TEXT = Explanation of Changes and Reasons for Change

NOTE: The majority of the revisions in this document consisted of adding new text, however some text was deleted. Any text that was deleted is documented in the RED text throughout the document.

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Changes and Reasons for Change:

1. Reformatted the document.
    a. Reason: The Microsoft Word document for the previous Minimum Standard Specifications for Streets was set up using an outdated formatting and methodology. Additionally, the document was created in an older version of Word and formatting issues occurred when saving to a more recent version of Microsoft Word. The Draft Revisions were prepared using an upgraded document format developed by Garver that includes a hyperlinked table of contents that automatically updates as changes are made. Additionally, this report has been saved to a more recent version of Microsoft Word without formatting changes.

1.0 GENERAL PROVISIONS

1.1 PURPOSE

A. These regulations govern the design, construction and maintenance of streets, alleys, driveway cuts, and sidewalks/trails which lie within the jurisdiction of the City of Bryant. These specifications are the minimum requirements, and it is understood that more stringent requirements may be mandated by a number of regulatory entities with regard to a specific project. Those entities include, but are not limited to the City Engineering Department, Public Works Department, Development Review Committee, and the Planning Commission.

Changes and Reasons for Change:

2. Added driveway cuts and trails to the list of items governed.
    a. Reason: To clarify that these items are governed by these specifications.
3. Deleted "*Bryant Street Department*" and replaced with "*City Engineering Department"*
    a. Reason: The Street Department is part of the Public Works Department so it should not be listed separately. City Engineering is now its own department so it should be listed separately.
4. Slightly reworded this sentence for clarity and changed "Bryant Public Works" to "Public Works Department".
    a. Reason: Enhanced clarity and to ensure consistency in naming convention throughout the document.

1.2 JURISDICTION

A. These regulations shall be applicable to all lands within the City of Bryant and to those areas within the City's duly adopted 'Planning Area', as enabled by State Statute – A.C.A. 14-56-413 – 'Territorial Jurisdiction'. Copies of the 'Planning Area' map, as adopted by the Planning Commission, are available at the City Planning and Community Development Department.

Changes and Reasons for Change:

1. Deleted: *"…its planning area. The planning area shall be defined as all land lying within five miles of the corporate limits."* And replaced with the highlighted language above.
    a. Reason: This was done to correct the incorrect definition of planning area and to define more specifically what the planning area is and where it can be obtained.

1.3 APPLICABILITY

A. All construction and development within the jurisdiction of the City of Bryant is subject to these regulations.

B. Nothing in these standards shall be construed to prevent the city from constructing incremental improvements to any existing city street, or any street shown on the Master Transportation Plan.

Changes and Reasons for Change:

1. Added Part B
    a. Reason: Recommend adding this language to ensure that the regulations do not prevent the City itself from constructing incremental improvements to public streets.

1.4 APPROVAL REQUIRED

A. All street designs are subject to the review and approval by the City of Bryant and/or their respective designee(s). Street improvements associated with private development shall receive City Engineering Department, Public Works Department, Development Review Committee, and Planning Commission approval prior to commencing construction.

Changes and Reasons for Change:

1. Added City Engineering, Public Works, and Development Review Committee to the list of departments and committees that will approve street improvements associated with private development.
    a. Reason: While the Planning Commission has the final approval, the other departments will also need to review and approve prior to Planning Commission review.

1.5 AMENDMENTS

A. Amendments to these regulations shall be presented to the Bryant City Council for adoption.

1.6 MODIFICATIONS

A. When strict interpretation of these regulations causes undue hardship, the City Planning Commission may consider a modification of specific requirements. Modification requests shall be submitted to the Planning Commission pursuant to the City's Development Regulations.

Changes and Reasons for Change:

1. Added Section 1.6
    a. Reason: This was added to spell out the process that should be followed for modifications to specific requirements of these regulations.

1.7 CONFLICTING REGULATIONS

A. All city ordinances or parts of ordinances inconsistent or in conflict with these regulations are hereby repealed and amended to comply herewith by virtue of the ordinance adopting this regulation. In the event design and construction specifications prepared separately by a licensed professional engineer for improvements associated with private development conflict with these regulations, the more stringent requirement shall govern.

2.0 GENERAL REQUIREMENTS

2.1 PERMITS

A. All permits required to accomplish the work shall be the responsibility of the Developer/Owner or Engineer of Record. Such permits may include but are not limited to Driveway Access Permit(s) from the City, permits for work within existing City right-of-way (ROW), permits for work within Arkansas Department of Transportation ROW, railroad crossing permits, Arkansas Department of Environmental Quality (ADEQ) permits, U.S. Army Corps of Engineers (USACE) permits, Federal Emergency Management Agency (FEMA), and other applicable city permits.

Changes and Reasons for Change:

1. Added "Driveway Access Permit(s) from the City"
    a. Reason: Recommend adding this to the list of possible permits since this is a new city permit being proposed.
2. Added "permits for work within existing City right-of-way"
    a. Reason: Recommend adding this here since it is an existing city permit that is commonly required.
3. The remainder of the changes are just various changes to the naming conventions of state and federal departments that may require permitting.

2.2 PLANS AND SPECIFICATIONS

A. Detailed plans and specifications shall be required for all new streets, street extensions, and one-half street improvements. Plans and specifications shall be prepared by a licensed Professional Engineer (licensed in the State of Arkansas).

B. Approval of the detailed plans and specifications by the City of Bryant does not constitute warranty of the plans and specifications and does not relieve the Engineer of Record of his professional responsibility in the design of the facilities or in the preparation of any engineering reports prepared in association with the project.

C. The standard specifications for Highway Construction as promulgated by Arkansas Department of Transportation (ARDOT), latest edition, and the Standard Drawings of the Arkansas Department of Transportation shall be the basis for the preparation of street plans and specifications and shall apply in all cases except where these Minimum Standard Specifications for Streets are in direct conflict with ARDOT standards. ARDOT standard specifications and standard drawings may be obtained on their website at *www.ardot.gov*.

Changes and Reasons for Change:

1. Changed AHTD to ARDOT
    a. Reason: ARDOT Changed their name in 2017
2. Listed where the ARDOT standard specifications and standard drawings can be obtained.
    a. Reason: Additional clarity and ease of use for readers.

2.3 RESPONSIBILITY OF DEVELOPER/OWNER

A. The Developer/Owner shall be responsible for construction of streets, including all design, construction, quality control testing, and for all costs associated therewith.

B. The Developer/Owner shall provide all engineering services required for planning, design, investigations, inspection, testing, and related activities necessary for street development, and shall be responsible for construction of street improvements in accordance with the design approved by the City of Bryant as satisfying the requirements of these regulations.

C. The City of Bryant shall have the right of access to sites during the planning, design, and construction phases of street development. The Developer/Owner shall schedule all activities to provide the City with adequate notice and review time.

Changes and Reasons for Change:

1. Added *"/Owner"*
    a. Reason: Consistency with "Developer/Owner" naming convention

2.4 ENGINEERING SERVICES

A. All engineering services, including but not limited to, planning, design, investigations, inspection, and testing shall be under the supervision of a Professional Engineer licensed in the State of Arkansas.

B. The design data, plans, specifications, and related information shall bear the name of the Engineer of Record. The seal of the Engineer of Record shall be placed on each sheet of the plans along with his/her signature.

C. Soil's investigations, materials testing, and quality control testing shall be performed by a laboratory approved by the City of Bryant.

D. Written certification by the Engineer of Record that materials and construction conform to the approved Plans and Specifications is required as stated in Section 4.6 of these specifications. Inspection and testing requirements are outlined in Section 9 of these specifications.

Changes and Reasons for Change:

1. Updated section references.
    a. Reason: update

2.5 PLAN SUBMITTAL

A. Plans, specifications, and all data submitted in conjunction with the plans and specifications shall constitute a complete design. Approval by the City of Bryant will not be issued until all requirements have been fulfilled. Approval of the plans and specifications shall remain in effect for one (1) year from the approval date. After that time, a new set of plans and specifications shall

be submitted, and any regulations or rules promulgated between the time of the original submittal and the new submittal date shall be followed.

B. All changes in the design or construction of a project or development, including all changes in the plans and/or specifications, shall be submitted to the City of Bryant for approval. The City of Bryant shall be notified immediately of all field changes in order that a timely approval may be issued.

2.6 OBSERVATION OF CONSTRUCTION BY THE CITY OF BRYANT

A. The observation of street construction by the City of Bryant will be limited to general observations of the project at various stages as outlined in Section 9 of these specifications. The City of Bryant reserves the right to observe the construction at all times. The City of Bryant observer shall have authority, subject to the final decision of the City Engineer, to condemn and reject any defective work and to suspend the work when it is not being performed properly or pending the settlement of any controversy. The City of Bryant shall have the authority to issue a Stop Work Order in the form of a written instruction/notice from the City revoking the developer's or contractor's rights to continue work on the project due to nonconformance with these Standards.

Changes and Reasons for Change:

1. Added highlighted language above.
    a. Reason: Construction observers typically have the authority to condemn, reject, or stop work if it is not being performed properly, however it was not previously granted in this document. This makes it clear what authority the observer has and when and how that authority can be exercised. This was listed as a city observed historical deficiency.

2.7 WORK WITHIN PUBLIC RIGHT-OF-WAY

A. All work within public right-of-way shall meet the requirements of these standards, Ordinance 2012-11, and all other applicable city ordinances, unless otherwise modified herein. All applicable permits shall be obtained by the Owner/Developer/Utility for any work taking place within public right-of-way.

B. No new excavations or bores shall be allowed after 1:00pm on Fridays or on weekends.

Changes and Reasons for Change:

1. Added Part A
    a. Reason: This Part was added to clarify what is required for work within Public Right-of-Way and to reference the requirements of Ordinance 2012-11.
2. Added Part B
    a. Reason: This is a new requirement to address a city observed historical deficiency. With new excavations and bores, there is a chance that underground city utilities will be damaged. This requires city staff to mobilize for emergency repairs. This requirement is added to reduce the chance that city staff will have to mobilize Friday evening or on weekends.

2.8 INSURANCE, PERFORMANCE BOND AND MAINTENANCE GUARANTEE

A. Insurance: Prior to any work beginning within the public right of way, the contractor or other appropriate person or entity shall provide proof of Liability Insurance with coverage limits acceptable to the City of Bryant. An insurance certificate naming the City of Bryant as additional insured, equipment liability insurance and any other proof of insurance coverage the city may deem necessary shall be provided to the City of Bryant Code Enforcement and Permit Department. The certificate of insurance shall cover liability for any injury to persons or property caused by the proposed project. Self-insurance is not acceptable. The City reserves the right to demand inspection of the entire insurance policy and endorsements and will require at least 30 days prior notification of cancellation or nonrenewable during the course of the proposed project.

Changes and Reasons for Change:

1. Added Part A
    a. Reason: The previous standards do not require that contractors working within public Right-of-Way carry insurance. Proof of Insurance is a common requirement throughout cities in Arkansas to ensure that the contractor has insurance to cover claims related to general liability, injuries, automotive, and property damage and to limit liability for the city. Insurance limits should be determined on a case-by-case basis depending on the nature of the work involved with the project.

B. Performance Bond: General.

In circumstances which the City allows or requires a performance bond for the completion of improvements required by a project, the following shall be required of the Contractor or other appropriate person or entity:

1. If a performance bond is posted to assure completion of the improvements, that performance bond shall also include provisions that automatically convert it to a maintenance bond upon completion of the improvements or on the date the performance bond lapses, whichever comes first, or a separate maintenance bond meeting the provisions of this article shall also be received by the city.
2. If the performance bond does in fact convert to a maintenance bond, said maintenance bond shall meet all the conditions in Certificate of Completion of Improvements stipulated in in these specifications.

C. Performance Bond: Improvements within Existing Right of Way

1. No person or contractor shall make any excavation in a public right-of-way unless a performance bond is first deposited with the City for the purpose of guaranteeing repair and replacement of city infrastructure in the public right-of-way. Said bond shall be in an amount equivalent to one-hundred twenty-five percent (125%) of the estimated cost of properly repairing and replacing city infrastructure in the public right-of-way, as estimated by the engineer-of-record, and agreed upon by the Public Works Department or the City Engineering Department.
2. Projects where half-street improvements and/or other improvements within the existing public right-of-way are required, all bonds for said improvements shall be separate and

distinct from interior streets or other public infrastructure interior to the private development site associated with concurrent or future phases of the project.

3. A performance bond for 125% of the cost of the improvements shall be required prior to commencement of any work within the City's existing right of way and shall be in place for the duration of construction until acceptance of all improvements by the City.
4. A person or contractor in the business of performing utility construction and/or maintenance that requires excavation in the public right-of-way or is engaged in a contract to perform work that includes excavation in the public right-of-way may provide a standing bond sufficient to cover the scope of the expected number of permits applicable to each and every site upon which to work is scheduled to take place and where a permit will be required. The standing bond will remain in place until the completion of all permitted work and all permitted work is fully inspected by the city and deemed to be satisfactory
5. The bond shall be forfeited, all or in part thereof, if within sixty (60) days after written notice, the person or contractor fails to reimburse the city for documented expenses incurred for its failure to comply with the rules of public safety, failure to close the opening within twenty-four (24) hours after the work has been completed, failure to complete the backfill and repair in accordance with specifications, failure to complete the necessary cleanup, or repair of damage to public property including but not limited to the street subgrade, asphalt surface, concrete surface, curb and gutter, sidewalk, and/or all infrastructure located within the public right-of-way or causing damage to vehicular or other traffic.
6. Bond release: Upon completion of work within the public right-of-way, the person or contractor who obtained the permit shall contact the city to schedule an inspection. The city will inspect the work within five (5) business days to determine if work is complete and if any damages were caused.
    a. If damage to the public right-of-way has occurred due to permitted work, the city will provide the person or contractor a list of required repairs. All repairs shall then be completed within thirty (30) days.
        1. Once repairs are completed, the city shall be notified for a follow up inspection. Once repairs have been confirmed, the bond will be released.
        2. If repairs are not completed within thirty (30) days and the person or contractor has failed to compensate the city for the city's expenses incurred in making such repairs within sixty (60) days after written notice, the bond will be forfeited.
    b. If no damages were caused, the bond will be released.

Changes and Reasons for Change:

1. Added Part B and C
    a. Reason: There are no requirements in the previous standards for contractors performing work within city ROW to provide performance bonds. A performance bond ensures satisfactory completion of the work in case the contractor begins work within City ROW, and then unforeseen circumstances causes them not to complete the work. In some cases, this situation may require the city to have to complete the work using the funds from the performance bond. Cities in

Arkansas typically require between 50% and 125% performance bonds, with Benton requiring up to a 250% performance bond depending on the project conditions. 125% Performance Bond would ensure that the city would have enough funds to complete the project due to unexpected increases in cost, or inflation since collecting performance bonds can be a lengthy process. However, some smaller contractors may have issues getting a performance bond greater than 100% of the project cost. See table at the end of this Section for a comparison of performance and maintenance bond amounts for various central Arkansas Cities.

D. After the Final Inspection and Acceptable Completion of the required public improvements, but prior to the city's acceptance of the public improvements and filing of the final plat or large-scale development, the Contractor or other appropriate person or entity shall provide the following:

1. Certification of Completion of Improvements: In accordance with Section 2.4 of these specifications, a certificate of completion of improvements shall be submitted prior to filing of the final plat or large-scale development.

Changes and Reasons for Change:

1. Added Item 1
    a. Reason: Clarification that this is required prior to approval as outlined in Section 2.4D of these specifications.

2. Itemized Cost Estimate of Improvements: The Developer/Owner/Contractor shall provide an itemized cost estimate for all improvements within public ROW or to be dedicated to the city, which shall be agreed upon by the City Engineer or their designee. The contractor shall also provide a separate itemized cost estimate for any portion of the stormwater management facilities, privately owned, within public ROW, or to be dedicated to the city.

Changes and Reasons for Change:

1. Added Item 2
    a. Reason: This cost estimate is required in order to determine the maintenance bond amounts for streets and stormwater.

3. Maintenance Guarantee: A maintenance guarantee shall be submitted to the City of Bryant which guarantees the maintenance, repair, and/or reconstruction of the project in whole or in part for a period of no less than two (2) years after the date of the Maintenance Guarantee. The maintenance guarantee shall meet the following conditions:
    a. For improvements within the existing public right-of-way or infrastructure improvements outside the right of way proposed to be dedicated to the City, a maintenance guarantee for the period of no less than two (2) years and shall be in the amount of one hundred percent (100%) of the costs of construction, but not less than $100,000, and shall be as estimated by the engineer-of-record and agreed upon by the City Engineer or their designee.

b. Any portion of the stormwater management facilities, privately owned or stormwater management improvements dedicated to the city, shall be covered under a separate maintenance agreement and one (1) year maintenance guarantee in accordance with City Stormwater Management Regulations (O-2019-32), Art. IV, Sec. 7. The value of the bond shall be an amount equal to 100% of the value of the stormwater improvements.
c. It shall be irrevocable and shall list the City as sole beneficiary.
d. It shall be in a form approved by the City Attorney.
e. At the end of the required guarantee period, by determination of City Staff and after consultation with the city's engineer, if the improvements do not perform and/or underperform as designed, the city shall be entitled to payment upon making demand for payment under the terms of the maintenance bond, cash deposit or letter of credit. The city shall be entitled to use all funds secured by the maintenance guarantee to assure the proper maintenance of the improvements.
f. The Developer/Owner shall not be entitled to any excess monies until the maintenance of the improvements have been satisfactorily completed.
g. The maintenance guarantee shall be in one of the following forms:
    1. Maintenance Bond
        a. Such maintenance bond shall meet the requirements of the maintenance guarantee described in the section above.
    2. Irrevocable Letter of Credit.
        a. If an irrevocable performance letter of credit is posted to assure completion of the improvements, that letter of credit shall include provisions that automatically convert it to an irrevocable maintenance letter of credit upon completion of the improvements or on the date the performance letter of credit lapses, whichever comes first.
        b. Such Letter of Credit shall meet the requirements of the maintenance guarantee described in the section above.
    3. An alternate method approved in writing by the Mayor of the City of Bryant.

Changes and Reasons for Change:

1. Added Item 3 regarding Maintenance Guarantee Requirements
    a. Reason: The previous standards required a 1-year street maintenance bond in the amount of 25% of the cost of street construction. Ordinance O-2019-32 requires that all stormwater facilities (public and privately owned) have a separate 1-year stormwater maintenance bond in the amount of 100% of the cost of construction. Per discussions with city staff, and after reviewing the maintenance bond amounts for other cities around the state, it was determined that the street maintenance bond would be increased from a 1-year to a 2-year time period, and should cover 100% of the cost of improvements. Per discussions with city staff, it is rare that major issues are apparent within the first year. An extended period of 2 years would allow the city more time to ensure that any major issues with the construction have been discovered prior to the maintenance bond expiring. Additionally, the maintenance bond amount was

raised from 25% to 100%. On smaller projects, it is possible that a major issue is found during the guarantee period that would require the entire project to be reconstructed. With a larger maintenance guarantee of 100%, the city can ensure that there will be enough fund to complete this work if the contractor is unable/unwilling to remedy the situation. Note that Maintenance Bonds are largely to protect the city from major issues that were not caught during the city's routine observation. While the City observers do review key parts of the contractors work to ensure it is meeting city standards, they can not be responsible for checking every component of the construction. The maintenance bond is a safety net for the city in case a project gets accepted that has major issues that were not caught with standard city observation.

2.9 ACCEPTANCE BY THE CITY

A. The city will not formally accept the project if any of the following items are not complete.

1. Streets
   a. All curb and gutter and street drainage slopes completed and backfilled.
   b. Final layer of asphalt in-place to required thickness and density.
   c. Street signs installed.
   d. Pedestrian accommodations constructed per approved plan including accessible ramps.
   e. Road right-of-way restoration substantially complete.
   f. Low or ponding areas in public street corrected.
   g. Street illumination paid for.
   h. Maintenance guarantee provided as described above.

2. Drainage.
   a. Drainage swales in place, sodded or concrete-lined, properly dedicated with erosion control measures in place.
   b. Detention/retention facilities to grade and draining properly.
   c. Outlet structures, pilot channels, headwalls, flumes, and other appurtenances in place and constructed to approved plans and specifications.
   d. Any needed off-site improvements or easements in place.
   e. Sodding of detention/retention ponds completed and established.
   f. Fencing of detention/retention ponds in place.
   g. Aeration facilities for retention ponds in place.
   h. All drainage inlets, outlets, and conduits in proper location and constructed to approved plans and specifications.
   i. Final layer of drainage paving in-place as required by approved plan, including parking lots.

Changes and Reasons for Change:

1. Added Part A
   a. Reason: Developers/Owners will sometimes request final plat approval and final acceptance of the project prior to some construction items being complete. This

can be a major issue if these items are critical infrastructure components and if the developer does not complete the items as promised after final approval. This section clarifies what items at a minimum must be complete prior to final approval.

B. Formal acceptance of the project by the City of Bryant will be made in writing after all of the requirements of Section 2.8 have been met, and after the posting of the Maintenance Guarantee, with the date of the formal acceptance being the same as that of the Maintenance Guarantee.

Changes and Reasons for Change:

1. Part B: Added the highlighted language. Deleted *"Warranty"* and replaced with "*Guarantee".*
    a. Reason: To clarify what is required prior to formal acceptance.

THE TABLE BELOW PROVIDES A COMPARISON OF CITY BONDING REQUIREMENTS THROUGHOUT CENTRAL ARKANSAS

City / Municipality *(m) - maintenance bond* *(p) - performance bond*	**Street Bonds** (m) - maintenance bond (p) - performance bond **% / Years**	**Street Bond Notes:**	**Stormwater / Drainage Bonds** **% / Term**
Benton	50% / 1 year (m)		
	up to 250% / no limit (p)	2.8.b	
Cabot	50% / 1 year (m)	1 year period is standard, however the City may require a longer time if it feels it is necessary	
	100% / no limit (p)		
Conway	50% / 1 year		50 / 1 year
Hot Springs	50% / 1 year (m)		
	100% / no limit (p)		
Little Rock	50% / 1 year (m)		100% / 1 year
	100% / no limit (p)	generally, 100%% of the total estimated cost to complete the improvements	
North Little Rock	50% / 2 years (m)	Art. 18 - Maintenance Bond	
	Varies (p)	Sect. 16.3; Allowed, terms and percentages for bonding are agreed upon on project basis	
Sherwood	Varies / 2 years (m)	Sec. 9.5	

2.10 DAMAGE TO EXISTING INFRASTRUCTURE OR PROPERTY

A. The Owner/Developer shall avoid damage, as a result of operations, to existing sidewalks, streets, curbs, pavements, utilities (except those which are to be replaced or removed), adjoining property, equipment, etc., and shall at the Owner/Developer's own expense completely repair any damage thereto caused by operations, to the satisfaction of the City. After damage discovery, the Owner/Developer shall immediately coordinate with the City on the complete repair and/or replacement work required. Following written notice of work required, the Owner/Developer shall expeditiously begin and finish this work with all labor and materials required. All repair and/or replacement work, labor, and materials shall be supplied and installed by the Owner/Developer. If the Owner/Developer fails to promptly perform the repair work and correct all deficiencies, the City shall have the option of remedying the defects at the Owner/Developer's cost.

Changes and Reasons for Change:

1. Deleted *"STREETS"* from the section title and replaced with *"INFRASTRUCTURE OR PROPERTY"*
    a. Reason: To convey that the owner/developer is responsible for other types of damage caused by them such as sewer, water, stormwater structures, and private property.
2. Deleted "*During construction of the property being developed, the Developer/Owner shall be responsible for damage to existing streets that are adjacent to the property being developed."* and replaced with the highlighted text in Part A above.
    a. Reason: This language provides more clarity about Owner/Developer caused damage and better defines the process that occurs after damage discovery. This addresses a city observed historical deficiency.

B. All street repairs shall be subject to the review and approval of the Public Works Department and/or the City Engineering Department

Changes and Reasons for Change:

1. Deleted "*City of Bryant"* and replaced with *"Public Works Department and/or the City Engineering Department".*
    a. Reason: To provide additional clarity on who is responsible for review and approval.

C. The Public Works Department and/or the City Engineering Department shall make the determination whether damage to existing infrastructure or property has occurred as a result of the Owner/Developer's operations.

Changes and Reasons for Change:

1. Added Part C
    a. Reason: To provide additional clarity on who determines whether damage to existing property has occurred.

2.11 ONE-HALF STREET IMPROVEMENTS

Changes and Reasons for Change:

1. Moved *"ONE-HALF STREET IMPROVEMENTS"* from Section 5.0 Pavement Design to Section 2.0 General Requirements.
    a. Reason: More appropriate context

A. When subdivisions, commercial developments, industrial developments, etc. are located on only one side of an existing street, one-half of the required right-of-way, from the center line of the existing right-of-way or from the centerline of the street whichever is greater, shall be provided. Right-of-way shall meet the minimum right-of-way requirements shown in City of Bryant Master Transportation Plan. The Development Review Committee shall determine which version of street classification and what right-of-way will be required.

B. When subdivisions, commercial developments, industrial developments, etc. are located on only one side of an existing street, one-half of the required street improvements, from the center line of the existing right-of-way or from the centerline of the street whichever is greater, shall be provided. Street improvements including asphalt or concrete paving, storm drainage, curb and gutter, sidewalks and other improvements shall be constructed in accordance with these specifications for that portion that adjoin existing streets.

C. At a minimum, cross-section shall be in accordance with the City of Bryant Master Transportation Plan and the requirements of these specifications. Pavement reconstructions to the center line of the existing street shall be required when the existing street does not meet the requirements of these specifications.

D. Geotechnical investigation requirements, for one-half street improvements, as stated in Section 6.3 may be waived by the Public Works Department.

Changes and Reasons for Change:

1. Part A: Deleted "*as stated in Section 4 of these specifications*" and replaced with highlighted language in Part A.
    a. Reason: To provide additional clarity to the reader on what is required and to specify the entity that will be responsible for determining which version of street classification will be required.
2. Part C: Deleted *"typical street cross section detail included with these specifications*" and replaced with highlighted language in Part C above.
    a. Reason: Updated to reference the Master Transportation Plan.

2.12 OFF-SITE STREET AND DRAINAGE IMPROVEMENTS

A. **Off-Site Improvements:** Off-site improvements are not adjacent to a project; off-site storm drainage improvements, off-site intersection improvements, and/or other similar improvements. Note: This is unique and separate from 'on-site improvements', which are directly adjacent to or

within a project site, such as widening the street along the project street frontage, constructing interior streets and utilities, etc.

B. **Standards Applicable:** Off-site improvements in the City and outside the City limits, but within the City's jurisdictional Planning Area shall be installed according to the City's standards; provided off-site improvements to roads located outside one mile of the City limits shall also be installed to the County's minimum standards. The Developer/Owner shall be required to bear that portion of the cost of off-site improvements which bears a rational nexus to the needs created by the development.

C. **Required Infrastructure Improvements:** Off-site improvements that are roughly proportional and bear a rational nexus to the impact of the development are required for all development within the City of Bryant's jurisdiction. The Developer/Owner shall be required to install off-site improvements where the need for such improvements is created in whole or in part by the proposed development.

D. **Planning Commission, Public Works, Planning and Community Development:** At the time the Planning Commission grants preliminary plat, preliminary large scale development, the Planning Commission along with recommendations from the Public Works Department and/or Planning Division shall determine whether the proposed development creates a need for off-site improvements and the portion of the cost of any needed off-site improvements which the Developer/Owner shall be required to bear; provided, that portion of the cost of off-site improvements to roads located outside the City's corporate limits but within the City's planning area shall require concurrence by the County. In determining that portion of the cost of off-site improvements which the Developer/Owner shall be required to bear, this amount may be agreed upon between the Developer/Owner and the City. If no agreement can be reached, the Planning Commission, along with recommendations from the Public Works Department and City Engineering Department shall consider potential impacts based on the rough proportion and rational nexus to impacts of the project.

E. Determining Necessity for Off-Site Improvements:

1. When a proposed development has access to paved streets or roads only by way of substandard or unimproved roads or streets leading from the development to the paved streets or roads, the Developer/Owner shall be responsible for contributing this proportionate share of the cost of improving the substandard access roads or streets to existing City or County standards. The Developer's/Owner's proportionate share of said costs may be agreed upon by the Developer/Owner and the Public Works Department. If no agreement can be reached the Public Works Department and City Engineering Department may determine in accordance with the provisions above or by the use of a detailed traffic study (paid for by the developer/owner and reviewed and approved by the City Engineering Department) where both existing and proposed traffic impact are evaluated.

2. When a proposed development has direct access to, or fronts on an existing road or street, which is below current standards, the Developer/Owner shall be responsible for contributing his/her proportionate share of the cost of improving said street or road to existing City or County standards. The Planning Commission, along with recommendations from the Public Works Department and City Engineering Department, shall determine the Developer's/Owner's proportionate share of said costs in accordance with the provisions above or in conjunction with the use of a detailed traffic study (paid for by the developer/owner and reviewed and approved by the City Engineering Department) where both existing and proposed traffic impact are evaluated.

3. Off-site drainage improvements associated with a proposed development shall be provided when required per the City's Stormwater Management Regulations. Scope of off-site drainage improvements shall be determined by the Planning Commission, along with recommendations from the Public Works Department and City Engineering Department and be based upon the rough proportion and rational nexus to impacts of the project.

F. **Modifications:** Requests for modifications of off-site improvements shall be submitted to the Planning Commission pursuant to the City's Development Regulations.

G. **Off-Site Dedication of Right-of-Way:** Off-site right-of-way dedication may be required as needed to construct off-site street improvements that are required based on the rough proportionality and rational nexus of the impacts of the project.

H. **Off-Site Streets & Drainage**: Street widening and/or new street construction off-site may be required to address traffic impacts based on the rough proportion and rational nexus of the impacts of the project. Street grading, base, and paving according to existing City standards and specifications as adopted by the City Council. Curbs and gutters off-site may be required to address drainage and/or traffic impacts based on the rough proportion and rational nexus to impacts of the project. Curbs and gutters shall be installed according to existing City standards and specifications as adopted by the City Council.

I. **Off-Site Sidewalks and Trails:** Sidewalks or Trails may be required to be installed off-site based on the rough proportionality and rational nexus of the impacts of the development.

Changes and Reasons for Change:

1. Added Section 2.12 OFF-SITE STREET AND DRAINAGE IMPROVEMENTS.
    a. *Reason:* The previous standard specifications did not have any written requirements or procedures for off-site improvements; however, off-site improvements were being required by the city when a development had an impact to off-site streets and drainage. As with other sections of this document, this change was made to offer clarity and predictability to the process. Having explicit language in this document describing when and how offsite improvements may be required allows developers to understand on the front end of the process how the determination of the necessity of improvements may be

made and how the process will work. It also makes clear that the developer is responsible for contributing their proportionate share based on the utilization of legal tests in recognized case law. Offsite Improvements are a reasonable and helpful tool for the City to have within its ordinances to help address the impact of development. While some developments have minimal impact to City infrastructure systems beyond the boundaries of their property, there are some developments that are highly impactful to the publicly maintained streets, drainage, water/sewer infrastructure outside the bounds of their property. As this infrastructure belongs to the public and is maintained by tax dollars received from the public, significant impacts to this infrastructure caused by a single development should not be expected to be subsidized by the general taxpayer. The City has only so much money and if the City must take on subsidizing significant improvements in favor of one entity (one business, or a handful of individuals) then that removes monies that could be available for street, water/sewer, and drainage improvements that could be beneficial to far more citizens and businesses throughout the City. It should be noted that offsite improvements are not warranted in many developments; usually only in large or highly impactful development types (i.e., very significant traffic generators, or a business which is a high utilizer of water/sewer infrastructure, etc.). Finally, from reading the codes of other Central Arkansas cities, requirement of offsite improvements is an option that can be utilized by other cities within the region but is not addressed as clearly within their ordinances. In light of this, it is not anticipated that the inclusion of clearly stated off-site improvement regulations for the City of Bryant would impact developers adversely when compared to other growing cities in central Arkansas. Detailed Off-site improvement regulation language like the language proposed for Bryant in this draft document is routine in other areas of the state.

2.13 DEFINITIONS

A. The following words, terms, and phrases, when used in this article, shall have the meanings ascribed to them in this section.

AASHTO - American Association of State Highway and Transportation Officials.

Acceptable Completion - This term shall mean substantial completion of the street construction as agreed upon by the City of Bryant and Engineer of Record.

ADEQ - Arkansas Department of Environmental Quality

ARDOT - Arkansas Department of Transportation

ASTM - American Society for Testing and Materials

Average Daily Traffic – The total traffic volume passing a point or segment of a roadway in both directions during an average 24-hour period.

Capacity – The maximum sustainable hourly flow rate at which vehicles reasonably can be expected to traverse a point or a lane on a roadway during a given time period under prevailing roadway, traffic, and control conditions. It is expressed in vehicles per hour per lane.

City - The City of Bryant, Arkansas and its employees expressly authorized by the Mayor to accomplish the specified task.

Contractor - The licensed contracting company hired by the Developer/Owner to construct the street improvements.

Developer/Owner - The person, firm, partnership, corporation, or other entity planning, constructing, altering, or reconstructing a public street.

Engineer of Record - The Arkansas licensed Professional Engineer responsible for the design of the improvements, usually engaged by the Developer/Owner.

Existing Traffic - In a traffic impact study, current traffic in accordance with recent traffic counts on the current road network.

Final Inspection - The final inspection shall be the formal inspection of the street construction by the Public Works Department, the Engineer of Record, and the contractor, which results in a declaration of acceptable completion.

Formal Acceptance - Acceptance of the street construction in writing after a Maintenance Guarantee has been submitted to and approved by the Public Works Department.

Level of Service (LOS) - A measurement, defined by the Highway Capacity Manual (HCM), to describe operational conditions within a traffic stream; generally described in terms of such factors as speed and travel time, delay, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Level Of Service Criteria - The Level of Service (LOS) for motorized vehicles, as defined by the Highway Capacity Manual, expressed via letter designations ‘A’ through ‘F’, as a ratio of base free-flow speed (mi./hr.) to actual or observed vehicle speeds.

Maintenance Guarantee -The security instrument which binds the Owner/Developer to a post-completion responsibility for street construction, repairs and/or reconstruction in the event of street construction failure.

Peak Hour - The one-hour period of greatest utilization of a transportation facility; weekdays normally have two peaks, one in the morning and one in the afternoon. It represents the most critical period of operation and the highest typical capacity requirements.

Peak Period - A three-hour or more period during which the transportation facility has significantly increased levels of use and includes the peak hour.

Peak Hour of Generation - The single hour of highest volume of traffic entering and exiting a site.

Street Construction - Where this or similar terms are used, it shall mean construction of the street, curb and gutter, drainage (whether on the street or not), sidewalks, and all other appurtenances normally associated with street construction and approved as part of the street plans, whether on-site or off-site.

Substantial Completion - The construction stage at which point all improvements and associated appurtenances have been fully constructed and are functional.

Traffic Generator - A designated land use (commercial, industrial, residential, office, etc.) or a change in land use that generates pedestrian and/or vehicular traffic to and from the site.

Traffic Impact - The effect of site traffic on the operations and safety of the road network

Traffic Impact Study - Study to assess the near term and long-term effects of specific development activity on the roadway system in a comprehensive manner. Development activity may include rezoning, platting and development plan approvals. The study shall include, but not be limited to, estimates of future traffic generation as well as recommended traffic mitigation improvements needed to reduce traffic impacts.

Traffic Mitigation - Reduction of traffic impacts on intersections and/or roadways to an acceptable level of service through the modification of the site plan, roadway construction improvements or improvements in the existing traffic control devices.

Trip - A one-way movement by a person or a vehicle having an origin and a destination

Trip Distribution - Allocation of the site generated trips to all possible routes to and from the site.

Trip Generation - The process of estimating the number of vehicle trips originating from or destined for the uses on a land parcel.

Trip Generation Manual - A comprehensive manual of quantifying trip generation, published by the Institute of Transportation Engineers (ITE), inclusive of common trip generation rates by common land use codes.

Volume-To-Capacity Ratio (V/C) - A performance measure computed using the ratio of an actual roadway volume to the capacity of a roadway.

Changes and Reasons for Change:

1. Added various terms and definitions

a. Reason: To define terms used throughout the document that were either missing or were added with these modifications

2.14 REFERENCES

A. References to various guidance on materials, testing, construction, and assessment such as AASHTO, ASTM, ARDOT, ITE, MUTCD, etc. shall refer to the latest editions of the reference standard.

Changes and Reasons for Change:

1. Added the highlighted text above and changed AHTD to ARDOT.
    a. Reason: to provide additional clarity and to reference ITE and MUTCD which are guidance documents referred to within these specifications.

3.0 TRAFFIC IMPACT STUDY

3.1 PURPOSE AND NEED

A. A formal Traffic Impact Study (TIS) may be required at the discretion of the City Engineer, Public Works Director, or Planning Commission in connection with a development if it is required to adequately assess future traffic impacts, including, but not limited to the following:
    1. To forecast the traffic impacts created by new development based on industry accepted practices and metrics.
    2. To determine improvements needed to accommodate new development.
    3. Determine how the proposed and existing land use impacts traffic.

B. Should a traffic impact study be required, it shall be conducted by an engineer, licensed to do business in the State of Arkansas. All costs associated with the traffic study shall be paid by the Developer/Owner.

3.2 DETERMINATION OF STUDY AREA

A. A key trigger for conducting a traffic impact study is "trip generation." The trip generation of a proposed development is the number of inbound and outbound vehicle trips expected to be generated by the proposed development during an average day or during a peak period.

B. The size and components required for traffic impact study shall typically include all site access driveways and adjacent intersections with 1000 feet to ½ mile depending on the amount of trip generation expected, however, the extent of the study area is to be determined by the Public Works Department and/or City Engineering Department based on the unique characteristics of each individual proposed development.

3.3 ELEMENTS, FORMAT, AND ANALYSIS

Should a traffic study by required, it shall contain the following minimum elements, format, and analysis. Additional elements and analysis may be required by the Public Works Department and/or City Engineering Department. Deviations from these elements and analysis shall not be allowed without written approval from the Public Works Department and/or City Engineering Department.

A. Executive Summary
    1. Descriptive Overview of the Project

B. Study Area
    1. Size of Study Area
    2. Site Accessibility
    3. Land Use(s) in the Study Area

C. Proposed Development
    1. Site Location / Vicinity Map(s)
    2. Land Use
    3. Site Plan
    4. Phasing & Timing

D. Existing Conditions
    1. Physical Characteristics
    2. Traffic Volume Counts
    3. Critical Gap in Traffic Flow
    4. Pedestrian and Bike Facilities
    5. Background (non-Site) Traffic
    6. Existing Level of Service (LOS)
        i. Reference Federal / State LOS Standards
            1. Signalized
            2. Non-Signalized

E. Site Generated Traffic
    1. Site Trip Generation
    2. ITE Trip Generation
    3. Trip reduction factors
        i. Pass-by Trips
        ii. Diverted Trips
        iii. Multi-Use Development (Mixed Use)
    4. Mode Choice
    5. Trip Distribution
    6. Site Traffic Assignment

F. Total Traffic Analysis
    1. Site Access Driveway(s)
    2. Future Level of Service Analysis (LOS)
    3. Queue Analysis
    4. Traffic Safety
    5. Pedestrian Safety
    6. Traffic Control Needs

G. Roadway and Intersection Mitigation or Improvements
    1. Define what 'Mitigation' means
    2. Define LOS thresholds that trigger required improvements.
    3. Articulate circumstances where 'mitigation' may have a negative impact on other site characteristics – historical, environments, unique urban / design standards, etc.)
    4. Establish process through which the City will work with the State if the operating agency is ArDOT.
    5. Establish detailed 'mitigation measures' that the City will allow.
        i. Transportation Demand Management (TDM)
        ii. Site Plan / Land Use Techniques
        iii. Roadway Improvements
        iv. Operational Improvements
        v. Access Management Techniques

H. Conclusions / Recommendations

I. Appendices / Tables

Changes and Reasons for Change:

1. Deleted Part 2.8 – NEED FOR A TRAFFIC STUDY which stated *"A formal Traffic Study/Traffic Impact Analysis (firm shall be approved by the City of Bryant) will be required for any development proposal expected to generate 5,000 or more vehicle trips daily, as calculated using the most recent version of the Institute of Traffic Engineers (ITE) Trip Generation Manual, or any other generally accepted traffic engineering criteria. For a rezoning case, the trip generation of the proposed zoning must increase by 1,000 vehicle trips daily over the current zoning."* and replaced with the highlighted text in Section 3.0 above.
    a. Reason: Traffic studies are often necessary for a variety of reasons such as determining if turn lanes are required, determining impact to nearby intersections, determining how the proposed development will affect existing traffic, and assisting in determining whether off-site improvements should be required. Depending on the size and expected impact of the development, these traffic studies can be significant or minor in scope. The previous requirements only required traffic studies for developments that are expected to generate 5000 or more trips daily. This is a very high threshold that will rarely be exceeded by developments. For example, according to the traffic study that was completed for the new Bryant Junior High School on Hill Farm Road, the expected trip generation was only 3,240 daily trips; however, a traffic study ended up showing that signalization at the nearby intersection was necessary, turn lane improvements were necessary, and adequate length of storage for parent pick-up and drop-off was necessary. The proposed modifications to these specifications remove the threshold of 5000 trips per day and gives the City Engineering Department, Public Works Department, or Planning Commission discretion on whether a traffic study should be required and what study area will be required based on the unique characteristics of each proposed development. Many Arkansas cities give similar discretionary authority to the City, while others attempt to set blanket traffic generation criteria for when a traffic study will be required. However, this blanket criteria falls short on accounting for the unique characteristics of each site. For example, a larger development in a rural area of town with no obvious traffic concerns may not need a traffic study, where a smaller development in an urbanized area of town located near a busy intersection may require a traffic study.

4.0 DESIGN DATA AND PLAN SUBMISSION

4.1 GENERAL

A. The submittal shall be complete with all necessary information included for review of the project. The material required shall include, but not be limited to the plans, specifications, geotechnical report, and drainage report. The final review will be concurrent with the review of all public improvements including water, sewer and drainage as accomplished through the Development Review Committee and the Planning Commission. Review based on partial submittals will not be allowed.

Changes and Reasons for Change:

1. Added highlighted sentence above
    a. Reason: Review based on partial and incomplete submittals is not currently allowed by the City. Adding this sentence clarifies that policy for readers.

4.2 DESIGN REPORT

A. The design report shall contain all information not normally shown on the plans or given in the specifications, including design calculations, results of soil borings, soil reports, soil test results, and any other data used in the development of the plans and specifications. The design report shall be made available upon request by the City of Bryant.

B. Geotechnical information shall be submitted in accordance with Section 6.0 of these specifications.

Changes and Reasons for Change:

a. Updated Section reference
    i. Reason: Update

4.3 HORIZONTAL AND VERTICAL DATUM

A. All street construction, including storm drainage facilities, shall be tied to the Arkansas State Plane Coordinate System, South Zone, using the North American Datum of 1983 (NAD83).

B. Elevation of controlling points shall be based on USGS NAVD 88 datum.

4.4 PLANS

A. The plans shall be submitted on 22" x 34" sheets. No other size shall be permitted unless specifically approved by the City of Bryant. Three sets of plans, including one AutoCAD compatible digital format copy and one pdf format copy, shall be required.

Changes and Reasons for Change:

1. Changed from *24" x 36"* to *22" x 34"*
    a. Reason: 24" x 36" is the standard architectural drawing size and 22" x 34" is the standard engineering drawing size. Since these specifications are for streets, this was changed to the standard engineering drawing size. This allows for true 11"x17" half size plans.

B. All submitted sheets shall have a title block, the Engineer's signature and stamp, and the date. Scales, legends, and north arrows shall be on all applicable sheets.

Changes and Reasons for Change:

1. Added Part B
    a. Reason: This clarifies the basic requirements of all plan sheets that are typically expected of engineering drawings and expected by reviewers.

C. Plan Layout

Changes and Reasons for Change:

1. Titled this section "Plan Layout"
    a. Reason: To provide additional clarity since the following requirements only refer to Plan View Layouts

Plans shall be submitted at the scale necessary to make the plans easily read and interpreted. Plans shall be on a scale of not less than 1" = 50'. The plans shall include, but not be limited to the following information:

1. Street right-of-way, proposed and existing
2. Existing and proposed utility and drainage easements
3. Existing and proposed property lines
4. Horizontal curve data
    a. P.C., P.I., P.T. Stations
    b. Degree of Curve
    c. Deflection Angles
    d. Radius
    e. Curve Length
    f. Tangent Lengths
5. Plan data with street grades and elevations
6. Centerline stationing
7. Street names
8. Intersection radii
9. Soil boring locations
10. Street and right of way dimensions
11. Driveway location with dimensions
12. Sidewalks and trails with dimensions
13. Handicap access ramp locations

14. Limits of cut and fill
15. Location and size of proposed and existing storm drainage facilities
16. Location and size of proposed and existing utilities
17. Location of any mapped Special Flood Hazard Areas on the effective FEMA FIRM.
18. Location (station, offset, and elevation) of all monuments/benchmarks used for vertical and horizontal control.

Changes and Reasons for Change:

1. Added the highlighted items above
    a. Reason: These are basic additions that are typically shown on engineering drawings for streets. Listing them here provides additional clarity to developers on what information should be shown on engineering drawings.

D. Street Profiles

Changes and Reasons for Change:

1. Titled this section “Street Profiles”
    a. Reason: To provide additional clarity since the following requirements only refer to Street Profile Layouts.

Street profiles shall be shown on a horizontal scale to match the layout with a vertical scale of not less than 1" = 5'. Information to be shown with the profiles shall include, but not be limited to:

1. Proposed and existing profile elevations at centerline labeled every 50 feet
2. Vertical curve data
    i. Curve length
    ii. “e” value at maximum vertical offset (middle ordinate)
    iii. PVC, PVI, PVT Stations and Elevations
    iv. “K” value
    v. Low/High point elevations
3. Proposed and existing drainage and utility line crossings (size, slope, and location)
4. Proposed finished grades at street centerline
5. Proposed finished grades at driveway centerline

Changes and Reasons for Change:

1. Item 1: Deleted “*Existing ground elevations*” and replaced with highlighted text in item 1.
    a. Reason: To clarify what is meant by “existing ground elevations”.
2. Added highlighted items above.
    a. Reason: These are basic additions that are typically shown on engineering drawings for street profiles. Listing them here provides additional clarity to developers on what information should be shown on engineering drawings.

E. Typical Sections

Changes and Reasons for Change:

1. Titled this section “Typical Sections”
    a. Reason: To provide additional clarity since the following requirements only refer to Street Typical Sections.

A typical street cross section for all classes of streets designed shall be included in the plans and shall show the following with associated dimensions:

1. Pavement type, width and thickness including subgrade and base layers
2. All materials and compaction density
3. Dimensions from back of curb to back of curb
4. Dimensions of all lanes, medians, and shoulders
5. Cross slope and crown
6. Location of centerline and profile grade
7. Curb and gutter (including type and width)
8. Existing and proposed grades
9. Side slope and side ditch grades including maximum slope labels
10. Right of way width
11. Sidewalks or trails. Include dimensions, buffer widths, and cross slope.
12. Landscaping, if required

Changes and Reasons for Change:

1. Added the highlighted items above
    a. Reason: These are basic additions that are typically shown on engineering drawings for streets typical sections. Listing them here provides additional clarity to developers on what information should be shown on engineering drawings.

F. Special Details (if required) – Special details should be provided if needed to clarify special construction issues or items.

G. Erosion Control Plan (if required) – Erosion control plans should be provided in accordance with the City of Bryant Stormwater Management Ordinance (O-2019-32), and the Stormwater Management Manual (O-2019-31).

H. Maintenance of Traffic Plan (if required) - Maintenance of traffic plans should be provided when it is necessary to detour traffic for extended periods of time or when traffic patterns will change during construction

I. Striping and Signing Plan (if required) - A striping and/or signing plan should be provided when the proposed project will install new or modify existing striping or signing.

J. Signalization Plan (if required) - A signalization plan should be provided if signalization is part of the on-site or off-site improvements.

K. Cross Sections (if required) - Cross sections at a maximum spacing of 50 feet should be provided if requested by the Public Works Department and/or City Engineering Department. Additional cross sections shall be where needed for clarification purposes.

L. Revisions to drawings shall show the nature of revisions and preparation date. Cloud revisions in plan and/or profile view(s).

Changes and Reasons for Change:

1. Added Parts F through J
    a. Reason: These are important components of engineering drawings that are often required for a street project; however, the previous street specifications were silent on these components.
2. Moved Item K to this location from the previous location under Typical Section criteria and modified the sentence for clarity.
    a. Reason: More appropriate context and additional clarity for the reader.

4.5 SPECIFICATIONS

A. Specifications shall be in accordance with Section 2.2C. Special provisions, outside of the items covered in Section 2.2C, shall include material requirements and methods of construction, quality control requirements, sampling, and testing procedures and frequency as specified in other sections of these specifications.

Changes and Reasons for Change:

1. Deleted "*Technical specifications*" and replaced with the highlighted text above.
    a. Reason: Since technical specification requirements are already outlined in Section 2.2C, this was added to reference those requirements.

4.6 AS-BUILT PLANS

A. As-Built plans shall depict an accurate account of the construction. Construction plans which are "rubber stamped" and submitted for the purpose of "As-Built" plans are not acceptable.

B. Three sets of "As-Built" plans, including one AutoCAD compatible digital format copy and one pdf format copy, shall be required along with the final costs associated with the street construction, and shall be due prior to the filing of the Final Plat. Engineer of Record shall certify in writing that all improvements meet the requirements of the approved construction drawings and City of Bryant Minimum Standard Specifications for Streets along with the "As-Built" plans.

5.0 STREET DESIGN PRINCIPLES

5.1 GENERAL

A. The principles governing the design of streets shall conform to the requirements of these specifications, and to the latest editions of ARDOT standard specifications, MUTCD, AASHTO - A policy on Geometric Design of Highway and Streets, and AASHTO - Guide for the Development of Bicycle Facilities, ITE - Highway Capacity Manual, Federal Americans with Disabilities Act - (A.D.A.) Regulations, to the standards that may be referenced herein, and to appropriate City Ordinances.

B. General criteria with regard to street classification shall be as stated in the City of Bryant Master Transportation Plan, the 'Heart of Bryant Development Code', or the 'Mid-Town Bryant Code' and regulating plans. The Development Review Committee shall determine which version of street classification and what cross section components will be required, (i.e., Urban, Industrial, Median, Parking, etc.)

C. Streets within commercial areas (commercial zoning) shall be constructed to "Collector" minimum standards unless otherwise identified on the Master Transportation Plan, the 'Heart of Bryant Development Code', or the 'Mid-Town Bryant Code' and regulating plans.

D. The Public Works Department and/or Development Review Committee may, at their discretion, determine if certain streets will be constructed to an alternate minimum standard than the corresponding cross-section contained in the Master Transportation Plan.

E. Storm drainage shall meet the requirements of the City of Bryant Stormwater Management Ordinance (O-2019-32), and the Stormwater Management Manual (O-2019-31). Valley gutters shall not be permitted.

F. Landscaping shall meet the requirements of the City of Bryant Landscape Ordinance.

Changes and Reasons for Change:

1. Part A: Minor changes to change AHTD to ARDOT, and add the ITE manual and ADA Regulations.
    a. Reason: ITE manual includes guidelines for traffic studies, and ADA regulations includes guidance on accessibility and walkability for those with disabilities.
2. Part B: Changed "Master Street Plan" to "Master Transportation Plan". Added two other regulating codes for Mid-Town and Heart of Bryant.
    a. Reason: To be consistent with adopted ordinances.
3. Part B: Deleted *"The City of Bryant Public Works and/or Development Review Committee shall determine if a street classified as a "Collector" shall be constructed to the "Rural Collector" or "Industrial Collector" minimum standards."* and replaced with the highlighted language shown.

a. Reason: The Master Transportation Plan has multiple versions of street section requirements depending on whether the corridor is urban, rural, has on-street parking, medians, etc.

4. Part C: Changed “Master Street Plan” to “Master Transportation Plan”. Added two other regulating codes for Mid-Town and Heart of Bryant.
    a. Reason: To be consistent with adopted ordinances.
5. Added Part D
    a. Reason: Gives the City the authority to deviate from the Master Transportation Plan Cross Sections based on unique site-specific conditions.
6. Part E: Added highlighted text.
    a. Reason: To reference relevant adopted ordinances regarding stormwater management and design.

5.2 HORIZONTAL ALIGNMENT

A. Horizontal curves shall be circular curves with minimum centerline radii based on **Table 1.** However, if the minimum centerline radius produces a curve with an arc length of less than 100 feet in length, the radius shall be increased to achieve a minimum arc length of 100 feet.

B. The minimum tangent length between reverse curves shall be 100’ for collector and arterial streets and 0’ for local streets.

C. The minimum Stopping Sight Distance (SSD) shall be based on **Table 1**. Roadways shall be designed to provide the minimum SSD at all locations along the roadway based on a driver’s eye height of 3.5 feet and an object height of 2.0 feet. Stop signs, yield signs, signals, and at-grade railroad crossings shall be visible by approaching cars for the entire length of the SSD. All street designs shall be checked in both the vertical and horizontal plane for sight distance obstructions that limit SSD to below the required amount. Any such obstructions shall be removed.

Table 1: Horizontal Alignment Design Criteria

Horizontal Alignment Design Criteria						
Design Element	Design Speed, MPH					
	20	25	30	35	40	45
Centerline Radius, Minimum, Feet	107	198	333	510	762	1039
Centerline Arc Length, Minimum, Feet	100	100	100	100	100	100
Stopping Sight Distance, Minimum, Feet	115	155	200	250	305	360

5.3 VERTICAL ALIGNMENT

Grades, vertical curves, and related criteria shall conform to the minimum requirements provided in this section.

Table 2: Vertical Alignment Grades

Vertical Alignment Grades			
Design Element	Street Classification		
	Local	Collector	Arterial
Longitudinal Grade, Percent			
Minimum	0.5	0.5	0.5
Maximum	11	10	7-9[a]
Maximum within 100 Feet of Intersection	6	6	6
Maximum within an existing or future crosswalk	2	2	2

[a] 9% for 30 mph, 8% for 35-40mph, 7% for 45-50mph

All vertical curves shall be symmetrical parabolic type curves. Minimum vertical curve lengths shall be determined by the following formula, but shall not be less than 3 times the design speed:

L = KA and K = L / A

Where:

L = Length of vertical curve, feet
K = Coefficient from **Table 3 and Table 4**
A = Algebraic Difference in Grades, Percent

Table 3: Design Controls for Crest Vertical Curves

Design Controls for Crest Vertical Curves			
Design Speed (mph)	Stopping Sight Distance (ft)	Rate of Vertical Curvature, K (Minimum)	
		Calculated	Design
20	115	6.1	7
25	155	11.1	12
30	200	18.5	19
35	250	29.0	29
40	305	43.1	44
45	360	60.1	61

Table 4: Design Controls for Sag Vertical Curves

Design Controls for Sag Vertical Curves			
Design Speed (mph)	Stopping Sight Distance (ft)	Rate of Vertical Curvature, K (Minimum)	
		Calculated	Design
20	115	16.5	17
25	155	25.5	26
30	200	36.4	37
35	250	49.0	49
40	305	63.4	64
45	360	78.1	79

Changes and Reasons for Change:

1. Added all text in Section 5.2 HORIZONTAL ALIGNMENT and Section 5.3 VERTICAL ALIGNMENT. The previous section on alignment was deleted which only contained the following:

   "The minimum curve radius for streets shall be as follows:
   a. Local 1 and 2/Residential Streets = 25 feet.
   b. Collector Streets= 35 feet.
   c. Arterial Streets = 50 feet.

   Street jogs with centerline offsets shall not be less than 125 feet."

   a. Reason: Horizontal and vertical alignments are a very important component of roadways for the safety and operation of the traveling public. The Section on Alignment from the previous specifications showed minimum curve radii for local, collector, and arterial streets that were significantly smaller than what is recommended by national and state guidance. The radii that were shown appear to be more in line with typical curb radii at sideroads and driveways as opposed to centerline radii along a street. The proposed revisions include requirements for horizontal curves and vertical curves based on speed, stopping sight distance values based on speed, minimum and maximum roadway grades based on street classification, and various other important safety and operational criterion that can be found in national and state street design guidance. Adding these proposed modifications to this section will include very important criteria that is critical to designing a safe roadway.

5.4 INTERSECTIONS

Note on the following section: The previous standard street specifications had very little on regulating intersections. Part D of this section was the only text regulating intersections previously. All of the following highlighted language was added to this section to provide additional criteria for intersections.

A. Intersection Curb Return Radii shall be as follows
   a. Local Street: 25 feet
   b. Collector Street: 35 feet minimum or individual design based on design vehicle, whichever is larger.
   c. Industrial Collector: 75 feet
   d. Minor Arterial Street: 50 feet minimum or individual design based on design vehicle, whichever is larger.

Changes and Reasons for Change:
1. Added Part A
   a. Reason: It is important to select an appropriate curb return radii based on the type of roadway and the expected traffic types that will utilize the facility. Too small, and trucks will overtrack the curbs. Too large, and intersections become wider than necessary making pedestrian crossing distances longer, which reduces safety. The previous standard street specifications did not have any regulations regarding intersection curb return radii. This makes it difficult for city reviewers to determine if curb return radii are appropriate. The highlighted text above includes commonly used curb return radii based on classification of streets. Truck turning templates based on the design vehicle should be checked for Collectors and Minor Arterials to ensure the appropriate cub radii is selected.

B. Design Vehicle: The Developer/Owner shall select an appropriate design vehicle for use in designing the project in accordance with these standards. Design vehicles are selected motor vehicles with the weight, dimensions, and operating characteristics used to establish highway design controls for accommodating vehicles of designated classes. The choice of design vehicle is influenced by the functional classification of a roadway, and by the proportions of the various types and sizes of vehicles expected to use the facility. **Table 5** shows typical design vehicles by roadway classification that can be used as a general guide for design vehicle selection, however alternate design vehicles may be required by the Public Works Department or City Engineering Department if site specific conditions warrant.

Table 5: Typical Design Vehicle Based on Roadway Classification

Typical Design Vehicle Based on Roadway Classification	
Classification	Typical Design Vehicle*
Minor Arterial	Intermediate Semitrailer (WB-50) to Interstate Semitrailer (WB-67)
Industrial Collector	Intermediate Semitrailer (WB-50) to Interstate Semitrailer (WB-67)
Collector	Intermediate Semitrailer (WB-40)
Local	Large School Bus (S-BUS 40) or City Fire Truck

* The choice of design vehicle and vehicle tracking criteria shall be approved by the Public Works Department or City Engineering Department.

C. Vehicle tracking templates based the design vehicle shall be used to determine the location of other elements such as median noses, concrete islands, channelized right turns, etc. The turning templates must show that the design vehicle will not over track outside the edge of roadway or curb, onto island or medians, into oncoming lanes of traffic, etc. Turning templates shall be in accordance with AASHTO using AASHTO Turning Templates, AutoTurn, or other approved method or software.

Changes and Reasons for Change:

1. Added Part B and C regarding design vehicles and turning templates
    a. Reason: It is important to ensure that streets are designed to accommodate the largest vehicle that is expected to utilize the street. Designers should check the street design to ensure that the design vehicle can navigate around curb radii, islands, medians, or any other obstructions. This is not expected to be necessary on local streets as long as the designer uses the minimum radii listed in section 5.4A, and as long as there are no special considerations, such as medians, islands, or acute intersection angles. Selecting a design vehicle and checking turning movements for street design is recommended by national and state guidance and is required by various other Arkansas cities.

D. Street intersections shall be as nearly at right angles as possible but not less than 75 degrees. Where street intersections are less than 90 degrees, the curb radius shall be increased as determined by the Public Works Department and/or the City Engineering Department. (changed from Street Department)

E. The minimum tangent length for street alignments approaching an intersection shall be 100 feet for collector and arterial streets and 30 feet for local streets.

Changes and Reasons for Change:

1. Added Part E.
    a. Reason: This is based on national guidance to improve sight distance and safety at intersections.

F. The minimum centerline offset between two streets that intersect a common street shall adhere to any applicable Access Management Plan (AMP) duly adopted by the City. In the absence of an AMP, the minimum centerline offset between two streets that intersect a local or collector street shall be 150 feet. The minimum centerline offset between two streets that intersect an arterial street shall be 300 feet.

G. The Distance between driveway access points and nearest public street and/or nearest driveway, shall adhere to alignment standards found in this Part, or as otherwise prescribed in any Access Management Plan (AMP) duly adopted by the City.

Changes and Reasons for Change:

1. Added Part F and G regarding access management
    a. Reason: To reference the city's adopted access management plans, and to include intersection spacing requirements to prevent closely spaced intersections that can reduce safety and traffic flow.

H. Intersections shall be designed to adhere to the intersection sight distance details shown in **Figure 1.**

I. The minimum Stopping Sight Distance (SSD) based on **Table 1** shall be provided for all intersection approaches.

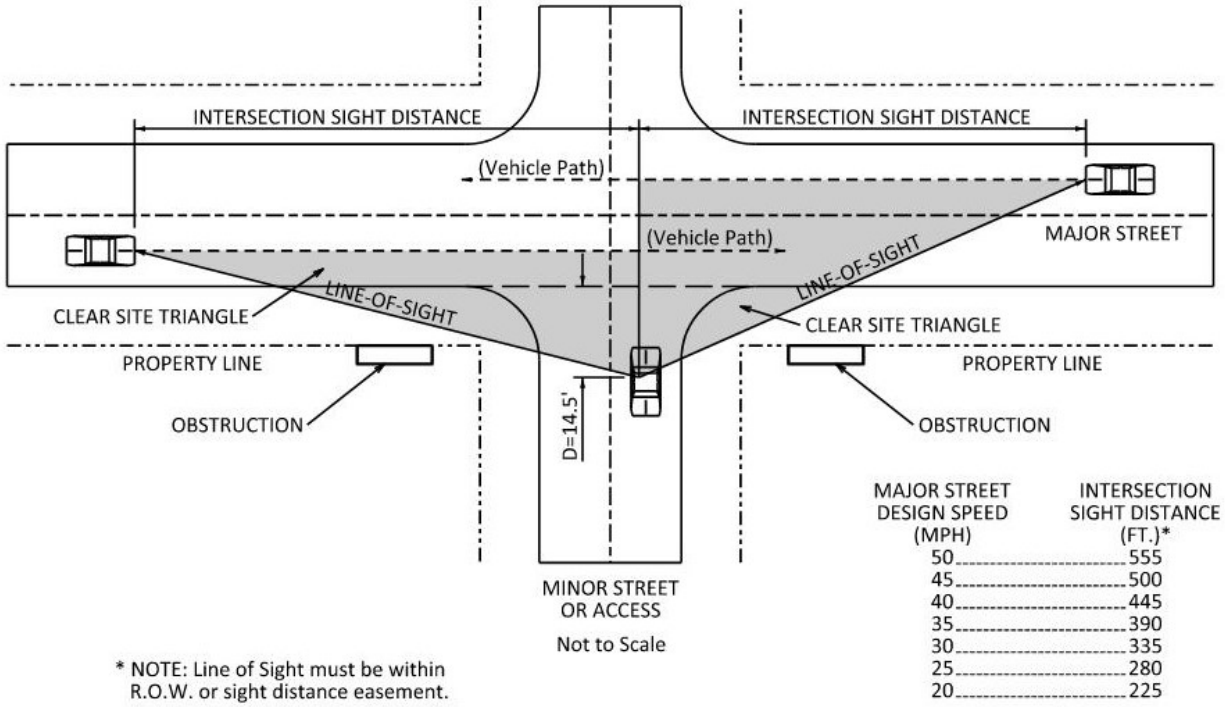
Changes and Reasons for Change:

1. Added Part H, Part I, and Figure 1 regarding Intersection and Stopping Sight Distance.
    a. Reason: National guidance recommends that all streets and intersections should be designed to have adequate sight distance at intersections and along streets to improve safety. The previous sight distance requirement did not distinguish between intersection sight distance and stopping sight distance, which have different requirements. It also did not distinguish between different design speeds, which have different sight distance requirements according to national standards.

J. Roundabouts will be considered by the Public Works Department or City Engineering Department for qualifying intersections on a case-by-case basis. For intersections where a roundabout will be implemented, all design standards and minimum requirements found in the latest edition of "NCHRP Report 672: Roundabouts: An Informational Guide" shall be met.

Changes and Reasons for Change:

1. Added Part J
    a. Reason: The previous specifications did not mention Roundabouts. This language references the national guidance document that should be used to govern roundabout design to ensure safe and effective design of roundabouts.



MAJOR STREET DESIGN SPEED (MPH)	INTERSECTION SIGHT DISTANCE (FT.)*
50	555
45	500
40	445
35	390
30	335
25	280
20	225

1. Sight distance is measured from a point on the minor road at 14.5 feet back from the edge of the major traveled way.
2. These values apply to passenger cars on 2-lane roads with stop control on the minor approach only. For special conditions such as multi-lane roadways, approach grades steeper than +/- 3%, intersections serving a significant volume of trucks, skewed intersections, yield control intersections, all-way stops, and signals, separate anlaysis is required in accordance with the latest edition of AASHTO - A Policy on Geometric Design of Highways and Streets.
3. At the intersection of two residential streets, the "D" distance shall be ten feet (10') and the approaching vehicle path shall be along the centerline of the street.
4. At the intersection of two residential streets, the minimum sight distance allowed is the stopping sight distance.
5. No object shall be located within the sight triangle that would obstruct the driver's view of an approaching vehicle on the major road. Such objects may inlcude buildings, parked vehicles, roadway structures, roadside hardware, hedges, trees, bushes, unmowed vegetation, tall crops, walls, fences and the terrain itself. The driver's eye height shall be 3.5 feet and the height of the approaching vehicle to be seen shall be 3.5 feet.
6. The profiles of the intersecting roadways shall be designed to provide the minimum sight distance for drivers on intersection approaches.

SIGHT DISTANCE AT INTERSECTIONS
(Intersections with stop control on minor road only)

Figure 1: Intersection Sight Distance

5.5 RIGHT OF WAY WIDTHS AND CROSS SECTIONS

Changes and Reasons for Change:

1. Deleted the following from this section and only retained the non-highlighted portions below in Part B and Part C.
    a. Reason: Many of the widths and details that were included in this section are no longer consistent with the adopted Master Transportation Plan. Additionally, the Master Transportation Plan now has multiple versions of each street classification which totals to 17 different street configurations with unique widths and dimensions. Additionally, if the Master Transportation Plan were to be updated in the future, updates would need to be made here as well. Given this, we recommend removing the dimensions from the Minimum Street Standards and just referencing the Master Transportation Plan for widths and dimensions.

DELETED THE FOLLOWING EXCEPT THE HIGHLIGHTED PORTIONS

A. The City of Bryant may require, at their discretion, different lane configurations and buffer zones for all street classifications, depending on the need for medians, tum lanes, bike lanes, etc.

B. Minor Arterial

I. The minimum right of way width shall be 80 feet.
2. The typical street cross section shall allow for four lanes.
3. The minimum pavement width shall be 57 feet back to back of curb.
4. Bike lanes with a minimum width of 5'-0" are required on both sides of the street.
5. There are numerous cross section configurations depending on possible features including medians, center tum lanes, and bike lanes. The street cross section shall be as determined by the Development Review Committee and Planning Commission. The City of Bryant may require different traffic and bike lane configurations if tum lanes are required by the City of Bryant. The City of Bryant may require additional pavement width to accommodate tum lanes.
6. Curb and gutter is required unless specific authorization to construct a paved shoulder and open ditches is granted by City of Bryant Street Department, City of Bryant Public Works, Development Review Committee, and/or City of Bryant Planning Commission. Width of paved shoulder (if allowed) and street cross section shall be as determined by City of Bryant Street Department and/or City of Bryant Public Works.
7. A sidewalk with a minimum width of5 feet is required on both sides of the road.
8. At a minimum, cross section shall be in accordance with the typical street cross section detail included with these specifications.

C. Collector

I. The minimum right of way width shall be 60 feet.
2. The minimum pavement width shall be 40 feet back to back of curb.
3. Bike lanes with a minimum width of6'-6" are required on both sides of the street.
4. Curb and gutter is required unless specific authorization to classify the road as a rural collector is granted by City of Bryant Street Department, City of Bryant Public Works and/or the Development Review Committee.
5. A sidewalk with a minimum width of 5 feet is required on both sides of the road.

6. A minimum 5'-0" buffer zone between the back of curb and the concrete sidewalk is required on both sides of the street.
7. At a minimum, cross section shall be in accordance with the typical street cross section detail included with these specifications.
8. The City of Bryant may require different traffic and bike lane configurations if tum lanes are required by the City of Bryant. The City of Bryant may require additional pavement width to accommodate tum lanes.

D. Rural Collector
   I. The minimum right of way width shall be 80 feet.
   2. The minimum pavement width shall be 40 feet from edge of shoulder to edge of shoulder .
   3. Bike lanes with a minimum width of6'-6" are required on both sides of the street.
   4. Paved shoulders with a minimum width of2 feet are required on both sides of the street.
   5. Open ditches shall be provided on both sides of the street.
   6. Curb and gutter is not required.
   7. A sidewalk with a minimum width of 5 feet is required on both sides of the road.
   8. A minimum 15'-0" buffer zone between the back of curb and the concrete sidewalk is required on both sides of the street.
   9. At a minimum, cross section shall be in accordance with the typical street cross section detail included with these specifications.
   10. The City of Bryant may require different traffic and bike lane configurations if tum lanes arc required by the City of Bryant. The City of Bryant may require additional pavement width to accommodate tum lanes.

E. Industrial Collector
   1. The minimum right of way width shall be 80 feet.
   2. The minimum pavement width shall be 40 feet back to back of curb.
   3. Bike lanes with a minimum width of6'-6" are required on both sides of the street.
   4. Curb and gutter is required unless specific authorization to classify the road as a rural collector is granted by City of Bryant Street Department, City of Bryant Public Works and/or the Development Review Committee.
   5. A sidewalk with a minimum width of5 feet is required on both sides of the road.
   6. A minimum 15'-0" buffer zone between the back of curb and the concrete sidewalk is required on both sides of the street.
   7. At a minimum, cross section shall be in accordance with the typical street cross section detail included with these specifications.
   8. The City of Bryant may require different traffic and bike lane configurations if tum lanes are required by the City of Bryant. The City of Bryant may require additional pavement width to accommodate turn lanes.

F. Local I/Residential
   I. The minimum right of way width shall be 50 feet.
   2. The minimum pavement width shall be 28 feet back to back of curb,
   3. Curb and gutter is required.
   4. A sidewalk with a minimum width of 5 feet is required on both sides of the road for local through streets. A sidewalk with a minimum width of 4 feet is required on both sides of the road in residential subdivisions.

5. *A minimum 3'-0" buffer zone between the back of curb and the concrete sidewalk is required on both sides of the street.*
6. *At a minimum, cross section shall be in accordance with the typical street cross section detail included with these specifications.*
7. *The City of Bryant may require different traffic lane configurations if turn lanes are required by the City of Bryant. The City of Bryant may require additional pavement width to accommodate tum lanes.*

G. *Local2*
   I. *The minimum right of way width shall be 50 feet.*
   2. *The minimum pavement width shall be 36 feet back to back of curb.*
   3. *Hike lanes with a minimum width of 5' are required on both sides of the street.*
   4. *Curb and gutter is required.*
   5. *A sidewalk with a minimum width of5 feet is required on both sides of the road for local through streets designated as Local 2.*
   5. *A minimum 2'-0" buffer zone between the back of curb and the concrete sidewalk is required on both sides of the street.*
   6. *At a minimum, cross section shall be in accordance with the typical street cross section detail included with these specifications.*
   7. *The City of Bryant may require different traffic lane configurations if turn lanes are required by the City of Bryant. The City of Bryant may require additional pavement width to accommodate tum lanes.*

A. Cross sections shall adhere to the minimum dimensional standards found within the Master Transportation Plan, the 'Heart of Bryant Development Code', and 'Mid-Town Bryant Code'. This includes all elements within the entirety of the public right-of-way, and as shown within the applicable regulating plan.

Changes and Reasons for Change:
1. Added Part A
   a. Reason: To reference the Master Transportation Plan, and other small area development codes.

B. There are numerous cross section configurations depending on possible features including medians, center turn lanes, and bike lanes. The Planning Commission, Development Review Committee, Public Works Department, the City Engineering Department may require, at their discretion, different lane configurations and buffer zones for certain street segments, depending on the need for medians, tum lanes, bike lanes, alternate pavement widths, alternate right-of-way widths, etc.

Changes and Reasons for Change:
1. Added highlighted text. Changed Street Department to City Engineering Department.
   a. Reason: Minor additions for clarity

C. Curb and gutter is required unless specific authorization to construct a paved shoulder and open ditches is granted by the Public Works Department or City Engineering Department. Width of paved shoulder (if allowed) and street cross section shall be as determined by the Public Works Department or City Engineering Department.

Changes and Reasons for Change:

1. Changed Street Department to City Engineering Department
    a. Reason: Updated Department structure.

D. Cross slope on new construction shall be normal crown and shall be 2%. For existing roadway modifications, widenings and overlays, the Public Works Department or City Engineering Department may approve a cross slope of between 1.5% and 3% if required by existing constraints.

Changes and Reasons for Change:

1. Added Part D.
    a. Reason: cross slopes requirements were not defined in the previous specifications. These slopes are consistent with national guidance and other cities within Arkansas.

E. Superelevated streets may only be used when other means of design will not work and is subject to review and approval by the Public Works Department or City Engineering Department. If allowed, superelevation shall not exceed 4.0% slope and the minimum runoff length shall be 100 feet. Superelevation shall not be used to reduce minimum radii on Local Streets.

Changes and Reasons for Change:

1. Added Part E
    a. Reason: Superelevation requirements were not defined in the previous specifications. Urban city streets are typically not superelevated due to low speeds, and drainage issues that can occur with superelevated curb and gutter sections. However, special circumstances may arise where superelevation is necessary. Basic slope and runoff distance requirements were included to govern those cases. Similar requirements were found in other Arkansas cities.

F. All streets shall have a minimum lateral offset of 1.5 feet between the curb face and obstructions such as utility poles, lighting poles, and fire hydrants. This lateral offset shall be increased to 3 feet within the limits of any intersection curb return.

Changes and Reasons for Change:

1. Added Part F.
    a. Reason: This is recommended to be added based on national guidance.

G. Side Slopes shall have a maximum slope of 3:1.

Changes and Reasons for Change:

1. Added Part G
    a. Reason: Side slopes steeper than 3:1 are less stable, and difficult to mow and maintain.

5.6 DESIGN SPEED

Changes and Reasons for Change:

1. Deleted "Sight Distance" and moved to Sections 5.2, 5.3, and 5.4 where alignments and intersections are discussed.
    a. Reason: More appropriate context
2. Deleted the following: *"Minimum sight distance for local/residential streets shall be 250 feet under ordinary conditions and 200 feet for hilly conditions. Collector streets shall have a minimum sight distance of 250-350 feet, depending upon topography."*
    a. *Reason: This requirement did not distinguish between intersection sight distance and stopping sight distance, which have different requirements. It also did not distinguish between different design speeds, which should have different sight distance requirements according to national standards. More information regarding sight distance requirements was added to Section 5.2, 5.3, and 5.4.*

A. The design speed shall be 25 mph for local streets, unless otherwise specified by the Public Works Department or City Engineering Department.

Changes and Reasons for Change:

1. Deleted 20-30 mph and changed to 25 mph for all local streets.
    a. Reason: To maintain one consistent design speed for all local streets and to clarify to readers what design speed is expected.
2. Added the option for Public Works or City Engineering to specify a different design speed based on unique site conditions.
    a. Reason: Clarification

B. The design speed shall be 25-35 mph for collector streets with final approval of design speed to be determined by the Public Works Department or City Engineering Department.

Changes and Reasons for Change:

1. Added the highlighted text in Part B.
    a. Reason: Clarification for the reader that approval of the design speed from the appropriate departments will be necessary. This is to avoid a reader picking a design speed within this range and completing their design without approval of the design speed.

C. The design speed for arterial streets shall be determined by the Public Works Department or City Engineering Department.

Changes and Reasons for Change:

1. Added Part C
    a. Reason: This was added for clarification purposes. The previous standards did not mention design speed for arterial streets.

5.7 DEAD END STREETS/CUL-DE-SACS

A. The maximum length for dead end streets/cul-de-sacs shall be 550 feet and shall be consistent with the fire hydrant spacing requirements of Section 1100, Part 1.22 of the "Standard Specifications for Design and Construction of Water Lines and Sewer Lines" which states that fire hydrants spacing shall not exceed 500 feet and that no lot shall be more than 250 feet from a fire hydrant.

B. Dead end streets/cul-de-sacs shall have a minimum turnaround right-of-way diameter of 100 feet.

C. The minimum turnaround pavement street radius shall be 45 feet and shall be in accordance with Appendix D of the Arkansas Fire Prevention Code. Larger than normal radii should be considered in industrial areas where large design vehicles (such as WB-67) frequently travel or make deliveries.

Changes and Reasons for Change:

1. Part A: Added the highlighted language shown.
    a. Reason: The requirements of City's Water Specifications state that fire hydrants spacing shall not exceed 500 feet and that no lot is more than 250 feet from a fire hydrant. This is relevant information when deciding the length of a dead-end street/cul-de-sac.
2. Part C: Changed 40 to 45 and added the highlighted language regarding compliance with the Fire Prevention Code and Design Vehicle considerations
    a. Reason: Most cities in Central Arkansas require a minimum cul-de-sac diameter of 40 ft to 50 ft. However, the minimum turning radii for a large school bus is 42.2 feet from the front edge of the bus. Therefore, we recommend increasing the radius to 45 ft to accommodate large school buses. However, special situations where larger design vehicles are expected should be checked. Lastly, the Arkansas Fire Prevention Code was added since it was not previously referenced in this document.

5.8 DRIVEWAYS

Changes and Reasons for Change:

1. All highlighted language below in Section 5.8 was added
    a. Reason: There was no language regulating driveways in the previous standards. The city's Master Transportation Plan (MTP) recommends further action to create and implement driveway access standards in order to regulate driveway access on city streets. Per the MTP, "access points along collectors and minor arterials should be kept to a minimum in order to facilitate traffic movements, reduce

crashes and fatalities, and to increase market areas for local businesses". Additionally, reduced access points provide increased accessibility and safety along trails and sidewalks, and reduces the need for reconstruction for the city's management of roadways. The following section includes regulations to promote the goals of the city's adopted Master Transportation Plan and access Management Plans.

A. Access Control for Driveways

1. The Distance between driveway access points and nearest public street and/or nearest driveway, shall adhere to alignment standards found in this sub-section, or as otherwise prescribed in any Access Management Plan (AMP) duly adopted by the City.

Changes and Reasons for Change:

1. All Part A.
    a. Reason: To reference the requirements of existing Access Management Plans.

B. Driveways - Generally

1. Access to property shall be allowed only by way of driveways and no other portion of the lot frontage shall be used for ingress or egress. Continuous curb cuts are prohibited. At least one driveway shall be permitted for any lot; however, shared drives are allowable in lieu of an individual/single-user driveway, and shared driveways shall be recommended for lots that have less than one hundred twenty (120) feet of frontage.
2. Individual driveways shall be located a minimum of ten (10) feet from the side property lines. A separation of at least twenty (20) feet is required between the driveways on one lot and the driveways on the adjacent lots. Driveways on the same lot shall be no closer than fifty (50) feet to each other.
3. Driveways used for residential ingress and egress shall not exceed 25 feet in width, exclusive of curb returns.
4. Driveways used for commercial/industrial ingress and egress shall not exceed 40 feet in width, exclusive of curb returns. They shall have minimum lane widths of eleven (11) feet for each lane and shall not have more than three (3) lanes in one entrance/exit. Measurements shall be front from curb face to curb face or lane edge to lane edge.
5. Driveway design shall be such that minimization of interference with through street traffic is achieved and shall be subject to site plan approval. The types of vehicles that a driveway is intended to serve shall be a prime factor in determining the acceptable radii of driveways.
6. Provisions for circulation between adjacent parcels should be provided through a coordinated or joint parking system.

Changes and Reasons for Change:

1. Added Item 1
    a. Reason: to Promote access management by reducing the number of curb cuts.
2. Added Item 2
    a. Reason: To promote access management. Driveway spacing from property line requirement was included to prevent the driveway entrance curb returns from

crossing over the property frontage of the adjacent parcel. Other cities in Arkansas have similar requirements ranging from 3 feet to 10 feet.

3. Added Item 3
    a. Reason: To promote access management, and to avoid excessively wide driveways within city right-of-way that the city will be responsible for maintaining. Other cities in Central Arkansas have similar width requirements such as Cabot (25 feet) and Hot Springs (24 feet).
4. Added Item 4
    a. Reason: To promote access management, and to avoid excessively wide driveways within city right-of-way that the city will be responsible for maintaining. Other cities in Central Arkansas have similar width requirements such as Cabot (40 feet) and Hot Springs (48 feet).
5. Added Item 5
    a. Reason: Some commercial driveways may serve larger vehicles. This item is added to ensure that these types of drives are designed appropriately for the design vehicle. (for example, a driveway that is too narrow and without adequate radii may require larger trucks to have to swing out into oncoming traffic for ingress and egress, therefore reducing safety and traffic flow on the main through lanes).
6. Added Item 6
    a. Reason: This was added to promote access management and shared driveways in applicable commercial areas.

C. Driveway Spacing

1. Arterial streets. Direct access to arterial streets shall be regulated in accordance with the following standards:
    i. **Spacing from controlled intersections:** All driveways providing access to arterial streets shall be constructed so that the point of tangency of the curb return radius closest to a controlled intersection (i.e., signalized, or all-way stop-controlled) is at least one hundred twenty (120) feet from the perpendicular curb face of the intersecting street.
    ii. **Spacing from other (non-controlled) access points:** All driveways providing access to arterial streets shall be constructed so that the point of tangency of the curb return radius closest to any non-controlled street or driveway intersection, is at least eighty (80) feet from the perpendicular curb face of the intersecting street or driveway.
2. Collector streets. Direct access to collector streets shall be regulated in accordance with the following standards:
    i. **Spacing from controlled intersections:** All driveways providing access to collector streets shall be constructed so that the point of tangency of the curb return radius, closest to a controlled intersection (i.e., signalized, or all-way stop-controlled) is at least one hundred twenty (120) feet from the perpendicular curb face of an intersecting arterial street and eighty (80) feet from the perpendicular curb face of an intersecting collector or local street.

ii. **Spacing from other (non-controlled) access points:** All driveways providing access to collector streets shall be constructed so that the point of tangency of the curb return radius closest to a non-controlled street or driveway intersection is at least eighty (80) feet from the perpendicular curb face of the intersecting street or driveway.

3. In the event that any of these spacing standards cannot be met because of an unusually narrow or shallow lot size, a reduction in spacing may be approved by the City Engineering Department as long as the reduction does not result in an unsafe traffic condition.

Changes and Reasons for Change:

1. Added Part C regarding Driveway Spacing
    a. Reason: This was added to promote access management by limiting how close driveways can be placed to adjacent intersections on collector and arterial streets. According to national guidance, "eliminating driveways within the functional area of an intersection helps reduce the number of decisions a motorist must make while traveling through an intersection and improves safety in the vicinity of the intersection." This is consistent with the access management objectives of the Master Transportation Plan. Specific and separate criteria is given for controlled and non-controlled intersections, and collector and arterial streets.

D. Driveway Design Standards

1. Concrete thickness for drives within City right-of-way shall be a minimum of 6 inches.
2. Asphalt thickness for residential drives within City right-of-way shall be 2 inches of asphalt over 7 inches of compacted Class 7 Aggregate Base Course.
3. Asphalt thickness for commercial drives within City right-of-way shall be 3 inches of asphalt over 7 inches of compacted Class 7 Aggregate Base Course.
4. No gravel driveways will be allowed within public right-of-way.
5. The maximum slope for a driveway shall not exceed 15%.
6. The maximum grade change for a driveway shall be 10% with a 15' minimum length between grade changes.
7. Driveways with a sidewalk or trail crossing shall have a maximum slope of 2% for a minimum of 4 feet wide within the crossing area of the sidewalk or path.
8. Driveways shall be designed to prevent street stormwater from leaving the street and flowing down the driveway. Driveways shall slope upward to reach an elevation equivalent to the top of curb before the driveway crosses the inside edge of sidewalk/path if present or within 10 feet of the edge of roadway if no sidewalk/path is present. A reduction in height may be approved by the City Engineering Department if acceptable stormwater calculations are provided showing that current or future depth of gutter flows during the design storm will not be higher than the proposed height of the driveway.

Changes and Reasons for Change:

1. Added Item 1
    a. Reason: There were no driveway thickness requirements in the previous standards. For the portion of the driveway within City ROW, it is recommended

that the concrete thickness be 6" to reduce severe cracking that the city would be responsible for maintaining if large trucks, moving vans, and/or RVs were to utilize the driveway. Other cities around central Arkansas such as Hot Springs, Little Rock, and Cabot also require all concrete driveways to be a minimum of 6 inches thick. This is also ARDOT's standard driveway thickness.

2. Added Item 2 and 3
    a. Reason: See reason for Item 1. This was added to provide an asphalt alternative standard to concrete.
3. Added Item 4
    a. Reason: This was not prohibited in the previous standards, however, due to increased maintenance requirements of gravel driveways, this was prohibited.
4. Added Items 5 and 6
    a. Reason: Many central Arkansas cities have similar driveway grade requirements to ensure that driveways are functional and traversable without excessive grades or breakovers. On average, most cities' driveway grade requirements are close to these recommended maximums. ARDOT has similar driveway grade criteria as well.
5. Added Item 7
    a. Reason: To comply with ADA, driveways with adjacent sidewalks should have a 4' wide portion that is 2% grade or less.
6. Added Item 8
    a. Reason: Many houses experience drainage issues due to driveways that immediately slope away from the road and allow street stormwater to escape the road and flow down the driveway toward the house. Driveways should be constructed to slope up first to a height that will retain any street stormwater before sloping down toward the house.

5.9 PAVEMENT MARKINGS

A. Pavement markings shall meet the requirements of the latest edition of ARDOT standard specifications, ARDOT Standard Roadway Drawings, MUTCD, AASHTO - A policy on Geometric Design of Highway and Streets, and AASHTO - Guide for the Development of Bicycle Facilities.

B. Thermoplastic markings shall be used on all pavement marking unless otherwise approved by the City Engineering Department or Public Works Department.

C. Typical striping widths for lane lines and centerlines are 6 inches.

D. Preformed thermoplastic shall be used for all pavement markings words and symbols such as arrows, "onlys," crosswalks, railroad crossings, school crossings, stop lines, yield lines, bike symbols and any other symbol required by the City.

E. Bike lanes shall be marked with the helmeted bicyclist symbol in accordance with the latest edition of the MUTCD.

F. Pavement shall be striped and marked at the time of construction if required by Public Works Department.

G. Pavement Markings in roundabouts shall be designed and installed in accordance with the latest edition of the NCHRP Report 672, Roundabouts: An Information Guide and the MUTCD.

Changes and Reasons for Change:

1. Part A: Changed AHTD to ARDOT. Added ARDOT Standard Roadway Drawings.
    a. Reason: Many Pavement Marking details are included in the ARDOT Standard Roadway Drawings, and are more clearly detailed than the requirements of the MUTCD.
2. Added Part B, C and D
    a. Reason: These material and width requirements are consistent with the striping requirements of ARDOT, and other central Arkansas Cities. These requirements will mainly apply to collectors, arterials, stop lines, and crosswalks.
3. Deleted the text: *"the bike lane pavement marking logo in accordance with the typical detail included with these specifications." and deleted the bike lane detail.*
    a. Reason: The bike lane logo detail included in the previous standards was only a picture and did not include dimensions or information regarding the bike lane logo. The MUTCD provides a sufficient detail that is consistent with the intent of the detail that was in the previous standards.
4. Part F: Deleted *"the City of Bryant"* and replaced with *"Public Works Department"*
    a. Reason: Additional clarity
5. Added Part G
    a. Reason: To state the applicable guidelines that should be followed if a Roundabout is approved by the City.

5.10 TRAFFIC SIGNS

A. All traffic control devices shall meet the requirements of the Manual of Uniform Traffic Control Devices (MUTCD), latest edition. The developer/owner shall obtain written approval from the City of Bryant City Engineering Department and/or City of Bryant Public Works Department to utilize special or ornamental traffic signs within a subdivision/development. Maintenance of ornamental and/or special traffic signs shall be the responsibility of the Developer/Owner, Property Owners Association, or Improvement District. Maintenance of ornamental or special traffic signs shall not be the responsibility of the City of Bryant.

B. The location of all traffic control devices shall be at the discretion of the City of Bryant Engineering Department and/or City of Bryant Public Works Department. No sign shall be placed where any portion of the sign encroaches on the roadway or restricts handicapped accessibility.

C. Traffic control devices shall be installed prior to occupancy of any residence, building, or placing the street in service.

D. The City of Bryant may require "No Parking" signs on one side of any street less than 30 feet wide face of curb to face of curb, or where vertical or horizontal alignment severely restricts sight distance.

E. Traffic control devices within ARDOT right-of-way shall meet the requirements of the latest edition of ARDOT Standard Specifications and shall be approved and permitted by ARDOT District 6 prior to installation.

F. Roundabouts signs shall be designed and installed in accordance with the latest edition of the NCHRP Report 672, Roundabouts: An Information Guide and the MUTCD

Changes and Reasons for Change:

1. Part A through E: Changed AHTD to ARDOT. Changed Street Department to City Engineering Department. Other minor miscellaneous changes and additions as highlighted above.
    a. Reason: Updated naming and to improve clarity.
2. Added Part F
    a. Reason: To state the applicable guidelines that should be followed if a Roundabout is approved by the City.

5.11 ALLEYS

A. Alleys may be required at the rear of all lots to be used for business purposes but shall not be provided in residential areas except where the Developer/Owner provides evidence satisfactory to the Development Review Committee and/or Planning Commission of the need for alleys.

5.12 STREETLIGHTS

A. Streetlights shall be required on all streets in accordance with the City of Bryant Master Transportation Plan and the Master Street Lighting Plan and shall be approved by the City Department and/or Public Works Department.

B. Maximum spacing between streetlights shall be in accordance with the City of Bryant Master Street Lighting Plan.

C. Streetlights including installation, materials, etc. shall be approved by the governing electric utility. All streetlights that are not approved and maintained by governing electric utility shall be maintained by Developer/Owner, Property Owners Association, or Improvement District, not by the City of Bryant.

Changes and Reasons for Change:

1. Part A: Deleted “as” and replaced with highlighted language
    a. Reason: To reference the applicable standards found in the Master Transportation Plan and Master Street Lighting Plan.
2. Part B: Deleted “300 feet” and replaced with highlighted language.

a. Reason: The Master Street Lighting Plan contains various street light spacing requirements.

3. Part C: Added highlighted text
   a. Reason: To clarify that improvement districts may have specific streetlighting standards that need to be followed.

5.13 ACCESS MANAGEMENT

A. Access management, as it relates to frequency, spacing, roadway function classification, or use type shall be in accordance with the Master Transportation Plan, duly adopted Access Management Plan (AMP), or those standards specified in this document, with the more stringent standard governing where conflicts arise.

B. If an Access Management Plan (AMP) has been adopted for particular corridors within the city, those AMP's supersede similar plans and/or guidance that may be found more generally in the Master Transportation Plan and/or in this document (see with O-2009-08; O-2012-01; O-2018-5; O-2020-21).

Changes and Reasons for Change:

1. Part A: Deleted "Street" and replaced with "Transportation". Added the highlighted language shown.
   a. Reason: to clarify access management requirements and where they are found.
2. Added Part B:
   a. Reason: Some access management plans may conflict with the standards in this document. This statement clarifies that the corridor specific access management plans supersede general requirements found in this document and others.

6.0 PAVEMENT DESIGN

6.1 PAVEMENT TYPES

A. Street pavement sections and shared-use trails shall be flexible type with an asphalt concrete hot mix pavement (ACHM). Curb and gutter and sidewalks shall be Portland Cement Concrete.

B. Flexible pavements shall consist of a crushed stone base course with an ACHM binder and/or surface course or a full-depth asphalt structure utilizing an ACHM Base Course.

C. Rigid type pavement structures consisting of a Portland Cement Concrete section and surface shall be used only with approval by the City Engineering Department or City of Bryant Public Works Department. Pavement design shall include full depth Portland Cement Concrete to the designed thickness with a crushed stone base course. Design thickness of concrete pavement and crushed stone base course shall be approved by the City Engineering Department or City of Bryant Public Works Department.

Changes and Reasons for Change:

1. Part A: Deleted "surface" and added highlighted text.
    a. Reason: Additional clarity and consistency in naming convention.
2. Part B: Deleted *"a asphaltic concrete surface"* and added highlighted text
    a. Reason: Additional clarity and consistency in naming convention.
3. Part C: Deleted "the city of Bryant" and replaced with highlighted text.
    a. Reason: Additional clarity.

6.2 PAVEMENT MATERIALS AND CONSTRUCTION

A. All pavement materials, construction methods, standards, time and temperature constraints, seasonal constraints, and performance requirements shall be in accordance with the latest edition of the ARDOT Standard Specifications for Highway Construction, and these specifications unless specifically approved otherwise in writing by the City of Bryant for a specific and individual exception.

B. Mix designs shall meet the requirements of the latest edition of ARDOT Standard Specifications.

Changes and Reasons for Change:

1. Part A and B: Changed AHTD to ARDOT

6.3 GEOTECHNICAL REQUIREMENTS

Pavement Design shall include a geotechnical investigation which shall include the following minimum requirements:

A. The geotechnical investigation shall be conducted by a geotechnical engineer approved by the City Engineering Department and/or City of Bryant Public Works Department. The geotechnical

engineer shall test and assess the soils under all proposed streets and provide a report of all testing reports, soil classifications, subsurface drainage requirements, and pavement design recommendations to the City Engineering Department and/or City of Bryant Public Works Department for review.

B. Three copies of the geotechnical report, including one PDF format copy, shall be provided to the City Engineering Department and/or City of Bryant Public Works Department along with the proposed street design drawings prior to starting construction on any road.

Changes and Reasons for Change:

1. Part A through C: Slightly reorganized for clarity. Added highlighted text. Changed "Street Department" to "City Engineering Department".
    a. Reason: Clarity

C. **Sampling and Testing**

1. The investigation and sampling of soils shall conform to AASHTO R 13 (ASTM D 420), and test procedures referenced therein.

2. All sampling and testing of soils shall be performed under the direct supervision of an Engineer who shall sign and stamp the geotechnical report. A representative of the City Engineering Department and/or Public Works Department shall be on-site to witness the sampling and testing unless instructed otherwise.

3. The minimum sampling and testing frequency shall be one density test, one liquid limit, one plasticity index, and one gradation and soils classification for each 300 feet of street or section thereof with a minimum of three sets of tests per project. More locations may be required at curve radii. The minimum depth of boring or excavation for in-situ materials shall be five feet below the top of the elevation of the final compacted subgrade.

4. Gradation, Atterberg limits, maximum compaction, and load bearing strength testing shall be provided to determine suitability of soils for use as subgrade material within the street.

5. *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. Select material shall meet the requirements of the ARDOT Standard Specifications

6. *Moisture Density Relationship:* Compaction testing of soils proposed for use as subgrade material shall be performed in accordance with AASHTO T-99 (Standard Proctor Test) methods.

7. *Load Bearing Strength:* Load bearing strength of soils shall be determined by the California Bearing Ratio Test (CBR) in accordance with AASHTO T 193 or ASTM D 1883. A minimum of one test shall be performed for each 300 linear feet of street; additional tests will be required where significant variation in soil conditions occurs.

   For CBR testing, the specimen shall be molded at approximately the optimum moisture content and 95 percent of the maximum dry density as determined by the corresponding laboratory proctor tests.

   CBR tests will be required for all in-situ soils, select material, and on-site borrow utilized in the subgrade construction.

Changes and Reasons for Change:

1. Part C: Added the highlighted text related to sampling and testing requirements for geotechnical investigations
   a. Reason: To provide adequate information for determining undercut, slope stability, optimum moisture, and pavement design in accordance with AASHTO Guide for Design of Pavement Structures.
2. Part C, Item 3: This was moved from Part A to Part C. Changed boring frequency from 500 feet to 300 feet. Changed boring depth from 4 feet to 5 feet. Added text about additional borings in Radii.
   a. Reason: These changes are more in line with standard geotechnical practices for streets.

6.4 SUBGRADE MATERIAL

Changes and Reasons for Change:

1. Moved this section from after “PAVEMENT DESIGN” to before “PAVEMENT DESIGN” and after “GEOTECHNICAL REQUIREMENTS”.
   a. Reason: More appropriate context.

Subgrade soils shall be all materials used for subgrade including in-situ materials and fill materials.

A. Subgrades for pavement shall be stabilized by mechanical compaction. Stabilization methods such as fabrics and chemical stabilization may be submitted for approval when supported by engineering data and calculations to substantiate the adequacy of the stabilized procedure.

B. Subgrade shall be compacted to 95 percent modified proctor density minimum. Moisture content shall be +/- 3% of optimum moisture unless otherwise supported by the site-specific geotechnical data and approved by City of Bryant Public Works.

C. Subgrade shall be prepared in such a manner that the aggregate base course shall be placed on a firm foundation that is stable and free from soft spots, pumping, dust pockets, wheel ruts, or other defects.

D. The top 24 inches of the subgrade shall be a material not susceptible to frost action unless modified with cement, lime or another method approved specifically by the City of Bryant Public Works to resist frost action. Soils classified as A-4 and A-5 including sandy silts, fine silty sand or lean clays are highly susceptible to frost action.

E. In-situ soils meeting the requirements outlined in these specifications may be utilized as subgrade material. In-situ soils used as subgrade shall be scarified to a minimum depth of 8-inches below finish subgrade, recompacted, and tested as described Section 8 of these specifications. Fill material for subgrade shall be placed in lifts not to exceed 8-inches compacted depth.

F. Methods and procedures for establishing the total depth of soil replacement and/or modification shall be as specified by the design engineer and geotechnical investigations. The adequacy of in-situ soils and fill materials as pavement subgrade shall be evaluated based upon the soil's classification, liquid limit, and plasticity index.

G. Soils with a liquid limit greater than 40, or a plasticity index greater than 15 shall be undercut and removed from the street section or improved by a design method of stabilization approved by City of City Engineering Department and/or City of Bryant Public Works.

H. Subgrade support capacity for flexible type pavements shall be determined from the load bearing strength (CBR) of the soils based on the correlation provided in Section 6.5

I. At minimum, the subgrade shall meet the following specifications unless an individual design, with calculations, is provided:

a. | | |
|---|---|
| AASHTO Soil Classification: | A-1, A-2-4, or A-2-5 |
| Passing no. 200 Sieve: | 35% max. |
| California Bearing Ratio (CBR): | ≥ 6 |

b. Material not meeting the soil classification and graduation requirements in Item a above but meeting the following specifications:

AASHTO Soil Classification	A-2-6, A-6
California Bearing Ratio (CBR):	≥ 6
Plasticity Index:	15 max.

J. Replacement of soils up to 4' in depth may be required by the City dependent upon testing results in soils report and/or field conditions.

K. Quality control testing shall be as specified in Section 8 of these specifications.

Changes and Reasons for Change:

1. Part C: added "aggregate"
    a. Reason: clarity since "Base Course" can be confused with ACHM Base Course.

2. Part G: Changed Street Department to City Engineering Department
3. Added Part H
    a. Reason: CBR is a key value for the pavement design process outlined in these specifications.
4. Added Part I
    a. Reason: To define acceptable soils for subgrade.
5. Added Part J
    a. Reason: Clarity to the reader that undercuts of up to 4 feet may be required. This is generally the upper end of the amount of undercut required for streets.

6.5 PAVEMENT DESIGN REQUIREMENTS

Changes and Reasons for Change:

1. Recommend deleting the following and replacing with the highlighted language in Parts A through G below:

"Minor Arterial

1. *Asphalt (ACHM) pavement, base course and subgrade minimum requirements shall be as shown in the typical cross section detail in these specifications.*

Collector

1. *Asphalt (ACHM) pavement, base course and subgrade minimum requirements shall be as shown in the typical cross section detail in these specifications.*

Rural Collector

1. *Asphalt (ACHM) pavement, base course and subgrade minimum requirements shall be as shown in the typical cross section detail in these specifications.*

Industrial Collector

1. *Asphalt (ACHM) pavement, base course and subgrade minimum requirements shall be as shown in the typical cross section detail in these specifications.*

Local I/Residential Streets

1. *Asphalt (ACHM) pavement, base course and subgrade minimum requirements shall be as shown in the typical cross section detail in these specifications.*

Local 2

1. *Asphalt (ACHM) pavement, base course and subgrade minimum requirements shall be as shown in the typical cross section detail in these specifications."*

A. Design Method: Pavement thickness shall be designed by the AASHTO Guide for Design of Pavement Structures, latest edition. Other design methods, including the Asphalt Institute method, may be approved on an individual basis.

Minimum criteria for thickness design for the AASHTO method is based on street classifications and is included in **Table 6**. Streets classified as arterial, and collector shall be designed on an individual basis and all criteria utilized shall be documented.

Changes and Reasons for Change:

1. Added Part A:

a. Reason: Added highlighted language shown to require pavement design in accordance to the AASHTO Guide for Design of Pavement Structures for Arterial and Collector streets. The current street specifications include preset thicknesses for local, collector and arterial streets. A number of variables can change required pavement thickness such as subgrade parameters, traffic loading, and truck loading. Due to this variability, it is recommended that thicknesses for collector and arterial streets be based on a pavement design as opposed to predetermined thicknesses.

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

Changes and Reasons for Change:

1. Added Part B
    a. Reason: 20 years is the standard length of time typically used in pavement designs.

C. Traffic Analysis: Maximum traffic characteristics, including traffic volumes and 18-kip equivalent single axle loads (ESALs), are provided in Section 6.5 for predetermined local street pavement sections. The developer/owner shall submit traffic data for all street classifications, including local, where traffic data is above the maximum criteria provided. The basis for traffic projections shall be included in data submitted.

The following equation shall be used when calculating the design traffic for 20-year projections:

Design Traffic = ESALs x DD x LD x 365 x 20

Where: ESALs = 18-kip Equivalent Single Axle Loads
DD = Directional Distribution
LD = Lane Distribution

Two Lane: ESALs x 0.5 x 1.0 x 365 x 20
Four Lane: ESALs x 0.5 x 0.8 x 365 x 20

Changes and Reasons for Change:

1. Added Part C
    a. Reason: This requires traffic data and basis for projections to be submitted for all streets. It also shows the equation and the inputs to be used for ESAL calculations based on the AASHTO method.

D. Resilient Modulus Correlation: The correlation of California Bearing Ratio (CBR) and Resilient Modulus for pavement design input should be made using the NCHRP 1-37A equation shown below:

$$M_R \text{ (psi)} = 2555 \times CBR^{0.64}$$

Changes and Reasons for Change:

1. Added Part D
    a. Reason: Resilient Modulus is a common factor determined by Geotechnical Investigations. This equations defines the correlation between resilient modulus and CBR for use with these specifications.

E. Design Reliability and Serviceability: The design reliability percentage and serviceability index inputs are shown for each functional classification in **Table 6.**

Table 6: Design Reliability and Serviceability Inputs

Design Reliability and Serviceability Inputs						
Classification	Reliability	Standard Deviation		Initial Serviceability	Terminal Serviceability	Performance
		Flexible	Rigid			
Minor Arterial	95	0.45	0.35	4.5	2.5	2.0
Industrial Collector	90	0.45	0.35	4.5	2.5	2.0
Collector	85	0.45	0.35	4.5	2.5	2.0
Local	80	0.45	0.35	4.5	2.0	2.5

Changes and Reasons for Change:

1. Added Part E
    a. Reason: This provides a quick reference table defining what factors to use for pavement design inputs. These factors are consistent with state and national standards for pavement design.

F. Pavement Material Parameters: **Table 7** provides pavement material parameters including standard specification reference, structural coefficients, and thickness constraints.

Table 7: Pavement Material Parameters

Pavement Material Parameters				
Material	Specification[1]	Structural Coefficient	Thickness (in.)	
			Minimum	Maximum
ACHM Surface Course	Section 407	0.44	2	4
ACHM Binder Course	Section 406	0.44	3	6
ACHM Base Course	Section 405	0.36	4	12
Aggregate Base Course	Section 303	0.14	6	12

[1] ARDOT Standard Specifications

Changes and Reasons for Change:

1. Added Part F
    a. Reason: This provides a quick reference to various other criteria needed in pavement design.

G. Minimum Local Street Pavement Sections: **Table 8** provides minimum pavement sections, based on the AASHTO method, for local streets to be used in lieu of an individual pavement design if the project specific subgrade and traffic data fall within the given ranges. A geotechnical investigation shall be conducted to determine subgrade parameters prior to utilizing the minimum residential pavement sections. Traffic analyses shall be conducted to determine average daily traffic and 18-kip equivalent single axle loads (ESALs). For CBR values less than 6 and ESALs exceeding the maximum shown in Table 8, an individual pavement design, including calculations, shall be provided for City's approval.

Changes and Reasons for Change:

1. Added Part G
    a. Reason: to reduce the engineering required for design of local streets, a quick reference table for local street pavements was pre-calculated based on a range or CBR values and projected traffic. While Geotechnical Investigations and traffic estimates will still be required for local streets, this will eliminate the need for a pavement design to be completed on most local streets.

H. Minimum rigid pavement (concrete) design thicknesses for all street classifications shall be as determined and recommended by the Geotechnical Investigation. Minimum rigid pavement thicknesses shall be approved by the City Engineering Department, City of Bryant Public Works and/or Development Review Committee.

1. Minimum concrete pavement thickness shall be determined by pavement design but no less than 6-inches.
2. Minimum base course thickness shall be determined pavement design.
3. Concrete pavement shall be Portland Cement Concrete with a minimum 28-day compressive strength of 4,000 psi. Concrete shall be air-entrained with a maximum 4-inch slump.

Changes and Reasons for Change:

1. Changed Street Department to Engineering Department. Added highlighted text to Item 1. Deleted *"the same as shown for asphalt on the typical cross section detail in these specifications"* from item 2 and replaced with highlighted text.
    a. Reason: National and State standards recommend performing a pavement design to determine concrete thickness based on expected traffic and truck loading.

Table 8: Minimum Local Street Pavement Sections

Minimum Local Street Pavement Sections					
Local Street Classification			Local Steet[1]		
			Low Volume 0 - 30 Lots	Mid Volume 31-150 Lots	High Volume 151 - 300 Lots
Traffic Characteristics[2]					
Average Daily Traffic (Two-Way)			200	700	1500
20 Yr. Design Traffic - ESALs			14,600	36,500	73,000
Minimum Pavement Sections (in.)[3]					
CBR[4]	Type[5]	Materials			
< 6	Requires Individual Design				
≥ 6	F	ACHM Surface Course	2.0	2.5	2.5
		Aggregate Base Course	7.0	8.0	9.0
	FD	ACHM Surface Course	2.0	2.0	2.0
		ACHM Base Course	4.0	4.5	5.0
≥ 10	F	ACHM Surface Course	2.0	2.0	2.5
		Aggregate Base Course	6.0	7.5	7.0
	FD	ACHM Surface Course	2.0	2.0	2.0
		ACHM Base Course	4.0	4.0	4.0

[1] Number of single-family home lots - For a loop or cul-de-sac, it will equal the number of lots on that street. For a continuing (through) street, it will equal the number of lots that will use the street when entering/exiting the subdivision.

[2] Maximum values. If results of traffic analysis indicate higher values, an individual pavement design shall be required.

[3] Additional base thickness or subbase may be necessary to meet all design requirements.

[4] California Bearing Ratio (CBR)

[5] Type of Pavement; F = ACHM Surface Course over Aggregate Base Course; FD = ACHM Surface Course over ACHM Base Course (Full Depth Asphalt Pavement)

6.6 PAVEMENT DESIGN REPORT

When required by the Public Works Department or City Engineering Department, an individual pavement design report shall include the following information to be considered for approval. The report shall be signed and stamped by an Engineer.

1. Study Area
    a. Site vicinity map depicting project area.
    b. Plat with street names labeled.
2. Traffic Data
    a. Existing and Future Average Daily Traffic (ADT)
    b. Heavy truck percentage
    c. 18-kip Equivalent Single Axle Loads (ESAL) determination
3. Soils Report
    a. Field Investigation
        i. Method of subsurface exploration
        ii. Boring locations on scaled drawings.
        iii. Boring logs
    b. Laboratory Testing (In-situ and borrow)
        i. Load bearing strength – California Bearing Ratio (CBR)
        ii. Natural water content
        iii. Atterberg limits
        iv. Sieve analyses
        v. AASHTO soil classification
        vi. Moisture-Density relationship (Procter Test)
    c. General Conditions
        i. Site conditions
        ii. Subsurface conditions
        iii. Subgrade support
        iv. Subgrade preparation
    d. Construction considerations
4. Pavement Design
    a. AASHTO pavement design calculations
    b. Recommended pavement sections

Changes and Reasons for Change:

1. Added Section 6.6 “Pavement Design Report”
    a. Reason: Pavement design report content and format was added to provide clarity to developers/owners on what information is expected to be submitted to the city for verification that the pavement design was completed in accordance with these standards.

6.7 AGGREGATE BASE COURSE

A. Aggregate base course material shall be crushed stone meeting the requirements of ARDOT Class 7 aggregate base course as specified in the latest edition of ARDOT Standard Specifications.

B. Aggregate base course shall be compacted to 98 percent modified proctor density minimum. Moisture content shall be +/- 3% of optimum moisture.

Changes and Reasons for Change:

1. Added "Aggregate" in front of Base Course. Changed AHTD to ARDOT.
    a. Reason: Clarifications since Base Course can be confused with ACHM Base Course.

6.8 ACHM COURSES

A. Materials for asphalt concrete hot mix (ACHM) base, binder, and surface courses shall meet the requirements of the ARDOT Standard Specifications.

Changes and Reasons for Change:

1. Changed the title of this section from "SURFACE COURSE" to "ACHM COURSES"
    a. Reason: Clarity since ACHM is a better defining term than Surface Course.
2. Part A: Deleted *"Surface course for flexible pavement designs shall utilize plant mix bituminous base and binder courses conforming to AHTD Standard Specifications."* and replaced with highlighted language
    a. Reason: Clarity

6.9 RIGID PAVEMENT

A. Surface course for rigid pavement shall be Portland Cement Concrete as specified in the latest edition of ARDOT Standard Specifications.

B. Joint layout details shall be provided in the construction plans when P.C. Concrete Pavement is utilized as a surface course.

Changes and Reasons for Change:

1. Added the Section Title "RIGID PAVEMENT"
    a. Reason: Clarity
2. Added Part B
    a. Joint layout details are a typical requirement for Concrete Pavement.

6.10 CURB AND GUTTER

A. Curb and gutter shall be Portland Cement Concrete with a minimum 28-day compressive strength of 4,000 psi. Concrete shall be air-entrained with a maximum 4-inch slump.

B. Aggregate Base Course shall extend to a minimum of 1 foot behind the back of curb and gutter. Compaction requirements shall conform to the requirements for street subgrade materials and shall extend a minimum of 1 foot behind the back of curb and gutter removing all soft spots and replacing with suitable material.

Changes and Reasons for Change:

1. Added Highlighted sentence
    a. Reason: This is added to provide adequate support under curbs since they are a part of the roadway structure that experiences traffic loading. When compared to the city's current practice of placing curbs directly on compacted soil, this practice is expected to improve the life of curbs and reduce differential settlement between the asphalt and concrete curbs. Additionally, this smooth, compact surface provides a solid platform for slip forms to place straight uniform curbs. Aggregate placed under and 1 foot behind the back of curb is a common practice in Arkansas, with cities like Conway, Fort Smith, Fayetteville, Rogers, and Bentonville all requiring this practice. Additionally, it is ARDOT's policy to construct all of their facilities with aggregate under and 1 foot behind the curb. Cities that do not require this include Little Rock and Sherwood. Other cities that do not have any apparent regulations governing this include Hot Springs, Cabot, and Benton.

C. Curb and gutter shall conform to the typical detail within these specifications or ARDOT Standard Roadway Drawing Details for curbing.

Changes and Reasons for Change:

1. Changed AHTD to ARDOT

D. Expansion joints shall be made with 1/2-inch preformed expansion joint filler of a non-extruding type. Expansion joints shall be placed at intervals not exceeding 195 feet, intersection radii, driveways, stationary structures, and sidewalks.

E. Contraction joints shall be sawed or formed at intervals not greater than 15 feet. Depth of saw-cut shall be 1 ½-inch and have a width of 1/4-inch. Contraction joints shall be sealed in accordance with ARDOT Standard Specifications.

Changes and Reasons for Change:

1. Changed 20 feet to 15 feet. Changed AHTD to ARDOT
    a. Reason: Recommend changing contraction join intervals from 20 feet to 15 feet. Municipalities typically use between 10 – 15 feet intervals. ARDOT uses 15 feet.

F. Forms shall be made of metal or wood and shall be properly braced. The minimum length of each section often used shall be 10 feet. Each section of form shall be uniform and free from undesirable bends or warps. Forms shall be of such cross section and strength and so secured as to resist the pressure of the impact and vibration on any equipment which they support without springing or settlement.

G. Curb and gutter placed with slip form or extruding equipment will be acceptable providing it complies with all of the above requirements.

H. After curing, the curb shall be immediately backfilled to within 4 inches of the top curb to eliminate the possibility of washing beneath the curb. The remaining 4 inches shall be topsoil.

I. Cold weather protection shall meet the requirements of the latest edition of ARDOT Standard Specifications.

J. Any cuts to the curb and gutter after the curb and gutter has been formed and poured shall be approved by the Public Works Department.

Changes and Reasons for Change:

1. Added Part J
    a. Reason: Recommended for inclusion by City Staff based on observed historical deficiencies.

SUBSURFACE DRAINAGE

A. Subsurface drainage shall be constructed where subsurface moisture will affect the stability of the subgrade and as recommended by the geotechnical investigations. Streets in cut sections and hillsides typically need subsurface drainage.

7.0 UTILITIES AND UTILITY CROSSINGS

7.1 GENERAL

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

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

C. All utilities shall be designed and installed in a manner that minimizes utilities under streets and curbs. All utilities crossing streets shall be near perpendicular to the street. Utilities located parallel to the street shall remain outside of the limits of the street section unless crossing perpendicular to the street. Utilities shall ensure that parallel utilities do not cross into the limits of the street around curves, corners or cul-de-sacs unless otherwise approved by the Public Works Department.

D. All non-metallic buried facilities placed within public right-of-way either parallel to or crossing the roadway, shall have an approved identification wrap of detectable tape or wire in order that the facility can be located by metal locators or other suitable devices.

E. All underground electrical lines within public right-of-way either parallel to or crossing the roadway shall include 3-inch minimum width underground detectable warning tape with red background and black letter stating, “CAUTION BURIED ELECTRIC LINE BELOW”. This tape shall be detectable, durable, highly visible, resistant to elements, and meeting or exceeding all industry standards.

F. All work within public right-of-way shall meet the requirements of these standards, Ordinance 2012-11, and all other applicable city ordinances, unless otherwise modified herein. All applicable permits shall be obtained by the Utility for any work taking place within public right-of-way.

G. Utilities shall be required to meet the Insurance, Performance Bond, and Maintenance Guarantee requirements outlined in Section 2.8 of these specifications.

H. No new excavations or bores shall be allowed after 1:00pm on Fridays or on weekends.

Changes and Reasons for Change:

1. Added Part A
    a. Reason: Clarifying Developer/Owner responsibilities for utility coordination
2. Added Part B
    a. Reason: Clarifying that there are other documents that govern the design of these facilities.
3. Added Part C

a. Reason: Added these requirements to minimize utilities under streets and curbs to reduce pavement cuts which disrupt traffic and reduce the quality of the street. This addresses a city identified historical deficiency.

4. Added Part D
    a. Reason: Detectable tape is a common practice and allows utilities to be located by detector if needed. This addresses a city identified historical deficiency.
5. Added Part E
    a. Reason: This detectable warning tape is common practice. This requirement will improve safety for those excavating and reduce power outages due to cut lines. This addresses a city identified historical deficiency.
6. Added Part F
    a. Reason: This is a reiteration that all work within ROW shall meet these standards and applicable ordinances to ensure that utility owners follow these standards. This addresses a city identified historical deficiency.
7. Added Part G
    a. Reason: This clarifies that utility owners are also required to meet the bonding and insurance requirements of section 2.8. This addresses a city identified historical deficiency.
8. Added Part H
    a. Reason: This is a new requirement to address a city observed historical deficiency. With new excavations and bores, there is a chance that underground city utilities will be damaged. This requires city staff to mobilize for emergency repairs. This requirement is added to reduce the chance that city staff will have to mobilize Friday evening or on weekends.

7.2 FRANCHISED UTILITY LINES

A. 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/Owner or the utility before the subgrade is completed.
    a. *Encasement Length* - The encasement length shall extend a minimum of six (6) feet beyond the back of curb or edge of pavement if no curb is present.
    b. *Encasement Depth* - The minimum depth of cover for encasement pipe shall be thirty-six (36) inches measured from the top of the encasement pipe to the top of the subgrade or forty-eight (48) inches measured from the top of encasement pipe to the top of pavement, whichever provides the greatest depth.

Changes and Reasons for Change:

1. Added Section 7.2
    a. Reason: Encasement pipe for utilities under the street was confirmed to be desirable by the city. This standardizes the use of encasement pipe throughout the city and standardizes the required depth to reduce conflicts with the street and street components like underground storm sewer.

7.3 WATER, WASTEWATER, AND STORM DRAIN LINES

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

Changes and Reasons for Change:

1. Added Section 7.3
    a. This promotes a uniform subgrade and reduces the chance of dips in the road due to cuts and recompaction across the subgrade.

7.4 BORING AND JACKING

A. All street, alley, sidewalk, road, highway or other public way, or curb and gutter crossings by utilities and other parties shall be required to be bored unless an open cut is approved by the City Engineering Department or Public Works Department. Open cut approvals shall not be withheld unreasonably and if required, shall meet the requirements of Section 7.5 or Section 7.6.

B. The depth of bury on installations which are jacked or bored under any street shall have a minimum depth of bury of thirty-six (36) inches measured from the top of the pipe or casing to the top of the subgrade or forty-eight (48) inches measured from the top of pipe or casing to the top of pavement, whichever provides the greatest depth. In the case of a street section with a ditch section, the bury shall be a minimum of twenty-four (24) inches below flow line, but still a minimum of the above referenced depth below street section, whichever is greater. If the pavement or curb and gutter structure is damaged by the jacking or boring installation, it shall be repaired in a manner approved by the City Engineering Department or Public Works Department.

C. Prior to any directional drilling operation, the contractor shall Pothole any utility mainline, service line, or storm drain that crosses the planned drill path. Pothole depth shall go to the planned drill path's depth even if that depth is beyond the deepest known utility line. At pothole locations, the contractor shall visually observe the drill stem and drill head during drilling to ensure the directional drilling machine operator avoids striking utility lines or storm drains along the drill path. Additionally, the contractor shall pothole at 100 foot intervals along the planned drill path to ensure proper alignment and grade are maintained.

Changes and Reasons for Change:

1. Added Section 7.4
    a. Reason: This stipulates that boring is the required method for installing utilities across streets unless otherwise approved. Boring reduces traffic disruption and quality reduction of the streets when compared to open cut methods. Additionally, this adds minimum depth of bury for utility installations that are jacked or bored to minimize future conflicts with the installed utility. Lastly, potholing requirements in accordance with OSHA recommended practices were added for directional drilling operations to minimize accidental damage to existing underground infrastructure during drilling operations. This is a historical deficiency identified by the city.

7.5 PAVEMENT CUTS - EXISTING STREETS

A. Pavement cuts for drainage and/or utility lines under existing streets shall be repaired in accordance with **Detail 8 or 9** included in Appendix A of these specifications.

B. Backfill material shall meet the requirements of ARDOT Class 7 aggregate base course as specified in the latest edition of ARDOT Standard Specifications.

C. Backfill material shall be compacted to 98 percent modified proctor density minimum. Backfill material shall be compacted in maximum 6-inch lifts. Open trenches shall be inspected by the Public Works Department and/or City Engineering Department prior to backfill.

Changes and Reasons for Change:

1. Part A: Deleted "the typical detail included in" and replaced with highlighted text.
    a. Reason: Additional clarity for the reader
2. Part B: Changed AHTD to ARDOT
3. Part C: Changed 12-inch to 6-inch. Added highlighted sentence regarding open trench inspection.
    a. Reason: Reduced maximum lifts to achieve enhanced compaction and reduce the occurrence of dips in the road due to poorly compacted utility trench backfill. Added sentence regarding open trench inspection to ensure the City has an opportunity to inspect prior to backfill of the trench. These were historical deficiencies identified by the city.

7.6 DRAINAGE AND/OR UTILITY CUT BACKFILL ON STREET UNDER CONSTRUCTION

A. Trenches backfill for storm drains and/or utility lines for all trenches excavated in areas to be paved shall be in accordance with **Detail 7** included in Appendix A of these specifications.

B. Backfill material shall meet the requirements of ARDOT Class 7 aggregate base course as specified in the latest edition of ARDOT Standard Specifications.

C. Backfill material shall be compacted to 98 percent modified proctor density minimum. Backfill material shall be compacted in maximum 6-inch lifts. Open trenches shall be inspected by the Public Works Department and/or City Engineering Department prior to backfill.

Changes and Reasons for Change:

1. Part A: Deleted "the typical detail included in" and replaced with highlighted text.
    a. Reason: Additional clarity for the reader
2. Part B: Changed AHTD to ARDOT
3. Part C: Changed 12-inch to 6-inch. Added highlighted sentence regarding open trench inspection.
    a. Reason: Reduced maximum lifts to achieve enhanced compaction and reduce the occurrence of dips in the road due to poorly compacted utility trench backfill. Added sentence regarding open trench inspection to ensure the City has an opportunity to inspect prior to backfill of the trench. These were historical deficiencies identified by the city.

8.0 STORM DRAINAGE AND DRAINAGE FACILITIES

8.1 GENERAL

A. Design of storm drains and drainage facilities shall be by a licensed professional engineer in accordance with the City of Bryant Stormwater Management Ordinance (O-2019-32), and the Stormwater Management Manual (O-2019-31).

B. All drainage structures for transporting of storm water located under the pavement shall be reinforced concrete pipe or reinforced concrete culvert.

C. All box culverts shall be designed meeting the AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications or the AASHTO Standard Specifications for Highway Bridges.

D. Precast box culverts shall be designed and constructed in accordance with Section 607 of the ARDOT Standard Specifications.

E. Pipes and culverts shall have smooth flow lines with no depressions and no indentations or protrusions into the interior.

F. Corrugated metal pipes and fiber glass pipes shall not be allowed.

G. Lift holes shall be filled with non-shrink grout.

H. Conflict boxes shall not be allowed unless approved by the Public Works Department

Changes and Reasons for Change:

1. Part A: Added reference to recently passed stormwater ordinances
2. Added Part C
    a. The previous standards did not have any requirements regarding design of box culverts and what methods and loadings to use. The methods listed here are commonly used throughout Arkansas.
3. Part D: Deleted *"shall be certified for H-20 loading when under streets."* and replaced with highlighted text.
    a. Reason: Loading requirements are within the newly added Part C. Section 607 of the ARDOT Standard Specifications have requirements that are specific to precast box culverts.
4. Deleted *"shall be connected with bands supplied by the manufacturer"* and replaced with highlighted language.
    a. Many municipalities have stopped allowing Corrugated Metal Pipes and Fiber Glass Pipes due to them not last as long as other types of pipe such as PVC, HDPE and Concrete. This was a city identified historical deficiency.
5. Added Part H

a. Reason: There are numerous issues with conflict boxes, mainly related to maintenance. Many municipalities in Arkansas have similar exclusions of conflict boxes. This was a city identified historical deficiency.

8.2 STORM DRAIN MATERIALS

A. Storm drainpipe materials shall meet the requirements the City of Bryant Stormwater Management Manual and these specifications.

B. Reinforced concrete pipe or reinforced concrete culvert shall be used for all storm drains and facilities under streets.

C. HDPE or Polyvinyl Chloride (PVC) shall be permitted alongside (parallel to) streets. These shall not be permitted under streets.

D. Driveway culverts shall be sized in accordance with the Bryant Stormwater Manual but shall be no smaller in diameter than 18 inches and shall be no smaller in diameter than the nearest upstream culvert unless otherwise approved by the Public Works Department.

Changes and Reasons for Change:

1. Part B: added highlighted text
    a. Reason: to clarify that box culverts are acceptable as well.
2. Part C: Deleted *"plastic pipe and polymer coated corrugated pipe"*
    a. *These pipe materials are commonly not allowed by municipalities due to their inferior performance.*
3. Added Part D
    a. Reason: This clarifies a common issue that city staff has seen. 18" is a common minimum pipe size in Arkansas. This is consistent with the cities stormwater manual. It is common practice to not reduce the size of downstream pipes since this could allow larger debris to pass the upstream pipe, but get clogged in the smaller downstream pipe.

8.3 BEDDING MATERIAL

A. Bedding material for reinforced concrete pipe shall be in accordance with the manufacturer's recommendations.

B. Bedding material for HDPE and PVC shall be granular bedding material. Bedding material shall extend to 6 inches above the top of the pipe and shall comply with ASTM D2321.

Changes and Reasons for Change:

1. Part B: added highlighted text
    a. Reason: To clarify requirements

8.4 DROP INLETS AND JUNCTION BOXES

A. Junction boxes and drop inlets shall meet the requirements of the City of Bryant Storm Water Management Manual and the latest edition of ARDOT Standard Specifications.

B. Concrete shall be Portland Cement Concrete with a minimum 28-day compressive strength of 4,000 psi.

C. All pipe entering and leaving the structure shall be cut flush with the inside face and grouted around the perimeter, as necessary.

D. All concrete surfaces shall be free of honeycomb and cracks.

8.5 BRIDGES

A. Bridges shall meet the requirements of the City of Bryant Storm Water Management Manual, the latest edition of the ARDOT Standard Specifications, and the latest edition of the AASHTO LRFD Bridge Design Specifications and ARDOT Bridge Division Policy Guidelines.

Changes and Reasons for Change:

1. Changed AHTD to ARDOT. Referenced applicable bridge design specifications and guidelines.
    a. Reason: The previous standards did not specify which guidelines should be used for bridge design.

9.0 QUALITY CONTROL TESTING AND INSPECTIONS

9.1 GENERAL

A. Materials and construction employed in street improvements shall be subject to inspection and quality control testing. All testing of materials and construction shall be provided and paid for by the Developer/Owner.

B. The Developer/Owner shall provide for inspections of street improvements during construction. The inspections shall be accomplished under the supervision of the Engineer of Record. The Engineer of Record shall provide certification that all materials and construction conform to the approved plans and specifications and with these minimum street standards.

C. The Engineer of Record shall furnish inspection whenever a critical construction activity is taking place. This means that a representative of the Engineer of Record shall be on-site whenever a critical construction activity is taking place.

D. All field tests required for a project shall be witnessed by the City of Bryant, Engineer of Record, contractor, or their authorized representatives.

E. The City of Bryant Engineering Department and/or Public Works Department shall be notified at least one day in advance of any test(s). It is the responsibility of the contractor to coordinate the scheduling of all tests with the City.

F. Mix designs for ACHM Pavement, Portland Cement Concrete Pavement, and Concrete for Structures shall be provided to and approved by the Public Works Department/City Engineering Department prior to placement.

Changes and Reasons for Change:

1. Part C: deleted “must” and replaced with “shall”
2. Part E: Deleted “street” and replace with “Engineering”
3. Added Part F
    a. Reason: It is common practice for the reviewing entity, in this case the city, to review asphalt and concrete mix designs to ensure the mix meets the requirements of these specifications before the material is placed.

9.2 QUALITY CONTROL TESTING

A. All testing shall be accomplished by a testing firm approved by the City of Bryant Engineering Department and/or Public Works Department and shall be performed under the supervision of a licensed Professional Engineer.

B. Sampling and testing locations shall be subject to approval by the City of Bryant Engineering Department and/or Public Works Department.

C. The City of Bryant reserves the right to require core sampling on asphalt streets. If required, asphalt streets shall be cored every 300 feet or portion thereof for the purpose of checking density and thickness, except that each cul-de-sac street shall have a minimum of three cores taken regardless of length, with one core being taken in the cul-de-sac. The location of the core shall be chosen by the City Engineering Department and/or Public Works Department so as to accurately represent the quality of the asphalt laid in a particular area. Core samples shall be used to indicate asphalt thickness, and in no case shall be more than 1/4-inch less than specified thickness. For cores that indicate thickness 1/4-inch to 1/2-inch less than that specified, "isolation" cores shall be required. To "isolate", the contractor, at no expense to the City of Bryant, shall cut cores 10 feet either side of the initial core. If one or both of the cores are in the acceptable tolerance, the section will be accepted. If one or both cores fail, then additional cores shall be cut 25 feet away from the initial core in the failing directions. Subsequent cores shall be cut at 50 ft. intervals in the direction of failure until a core that passes tolerance is obtained. The isolated area shall be that which falls within the limits of acceptable thickness. The areas that fall within the 1/4-inch to 1/2-inch less than specified thickness shall be removed and replaced or warranted for five years at 150% of construction cost based on the estimate provided by the Engineer of Record. Areas that are determined to exceed the 1/2-inch less than specified thickness shall be removed and replaced within the limits of the acceptable thickness determined by the isolation method. Core holes shall be filled with non-shrink grout flush with final surface within 24 hours of test.

D. The City of Bryant reserves the right to require core sampling on concrete streets. If required, concrete streets shall be cored every 300 feet or portion thereof for the purpose of checking thickness, except that each cul-de-sac street shall have a minimum of three cores taken regardless of length, with one core being taken in the cul-de-sac. The location of the core shall be chosen by the City Engineering Department and/or Public Works Department so as to accurately represent the quality of the asphalt laid in a particular area. Core samples shall be used to indicate thickness. Thickness shall not be more than 0.50-inches less than specified thickness. Core holes shall be filled with non-shrink grout flush with final surface within 24 hours of test.

E. For concrete streets, one set of cylinders shall be taken at the beginning of every pour then for every 200 CY or portion thereof. Concrete testing out less than 85% of design strength shall be removed and replaced. For concrete falling between 85% and 100% of design strength, an extended five-year warranty shall be provided at 150% of construction costs based on an estimate provided by the Engineer of Record.

Changes and Reasons for Change:

1. Moved previous sub-part C and sub-part D regarding density tests on subgrade, aggregate base course and tolerances for aggregate base course to 9.3 subgrade and 9.4 aggregate base course.
    a. Reason: For more appropriate context
2. Changed Street Department to City Engineering Department throughout.
3. Part C and D: Changed minimum number of Cores on cul-de-sac streets from two to three
    a. Reason: Cores at the beginning, middle, and end of street,

4. Part E: changed 1000 LF to 200 CY
    a. Reason: E. It is recommended to use a quantity-based measurement (200 CY) as opposed to a length-based measurement (1000 LF) to account for different widths of roadways, intersections, thicknesses, etc. On a 22' wide street with 6" of concrete, this comes out to about 1 set of cylinders every 500 feet.

9.3 SUBGRADE

A. After the subgrade is prepared in accordance with these specifications, a wheel proof-roll test is to be completed by the Contractor/Developer/Owner. Using a loaded dump truck (62,000 lb.), or other approved method, drive over the surface looking for any movement, pumping, rutting, or tracking. All soft spots and areas that are pumping shall be removed and backfilled with ARDOT Class 7 base course material or other material approved by the City Engineering Department and/or Public Works Department in accordance with these specifications and the latest edition of ARDOT standard specifications.

B. After the Contractor/Developer/Owner has completed the wheel proof-roll test and finds the subgrade to be stable, then and only then, is the City Engineering Department and/or Public Works Department to be notified to conduct a final wheel proof-roll test.

C. A representative of the City Engineering Department and/or Public Works Department shall complete a proof-roll test (or other approved method) with a rubber-tired loaded dump truck weighing a minimum of 62,000 lbs. after the subgrade has been prepared and tested by the Contractor/Developer/Owner. The Contractor/Owner/Developer shall provide a minimum 24-hour notice to the City Engineering Department and/or Public Works Department prior to the proof roll test. The appropriately loaded dump truck shall either by provided by the Contractor/Developer/Owner along with a weight ticket, or the Contractor/Owner/Developer can pay the City a fee of $500 for the City to provide the loaded dump truck. If the subgrade fails the proof-roll test and a representative of the City of Bryant has to perform another test, there will be a $250.00 fee for each additional proof-roll test which shall be paid by the Owner/Developer.

D. Density tests are required in accordance with **Table 9** and the latest edition of ARDOT standard specifications. Density tests on subgrades shall be taken every 200 CY or portion thereof with a minimum of 1 per lift, except that each cul-de-sac street shall have a minimum of two tests taken regardless of volume and all curve radii shall have a minimum of 3 tests taken. Compaction shall be in accordance with Section 5 of these specifications. The City Engineering Department and/or Public Works Department shall be notified at least one day in advance of any density test(s). A representative of the City Engineering Department and/or Public Works Department shall be on-site to witness the test(s) unless instructed otherwise. Copies of all test results shall be sent to the City of Bryant Public Works.

E. The subgrade shall meet all of the requirements of these specifications prior to aggregate base course being placed.

F. If the succeeding aggregate base course is not placed immediately after the subgrade has been prepared and it becomes rutted, rough, or unstable, the subgrade shall be shaped and re-compacted in accordance with these specifications and the latest edition of ARDOT standard specifications.

Changes and Reasons for Change:

1. Throughout: Street Department changed to City Engineering Department. AHTD changed to ARDOT
2. Part C: added the highlighted language shown. Changed fee from $200 to $250.
    a. Reason: This language was developed based on discussions with City staff regarding previous issues on this topic. This requires proper notice prior to proof roll tests and specifies who is responsible for paying for/providing the proof roll test. Fee was increased to cover the city's cost of providing another proof roll test.
3. Part D: Added the highlighted language shown. Some of this highlighted language was relocated from Section 9.2. 300 LF was changed to 200 CY, the requirement for three tests in curves was added.
    a. Reason: It is recommended to use a quantity-based measurement (200 CY) as opposed to a length-based measurement (300 LF) to account for different widths of roadways, intersections, etc.
4. Part E and F: Added "aggregate"
    a. Reason: Clarity

9.4 AGGREGATE BASE COURSE

A. After the aggregate base course is prepared in accordance with these specifications, a wheel proof-roll test is to be completed by the Contractor/Developer/Owner. Using a loaded dump truck (62,000 lb.), or other approved method, drive over the surface looking for any movement, pumping, rutting, or tracking. All soft spots and areas that are pumping shall be removed and backfilled with ARDOT Class 7 base course material or other material approved by the City Engineering Department and/or City of Bryant Public Works in accordance with these specifications and the latest edition of ARDOT standard specifications.

B. After the Contractor/Developer/ Owner has completed the wheel proof-roll test and finds the aggregate base course to be stable, then and only then, is the City Engineering Department and/or Public Works Department to be notified to conduct a final wheel proof-roll test.

C. A representative of the City Engineering Department and/or Public Works Department shall complete a proof-roll test (or other approved method) with a rubber-tired loaded dump truck weighing a minimum of 62,000 lbs. after the aggregate base course has been prepared and tested by the Contractor/Developer/Owner. The Contractor/Owner/Developer shall provide a minimum 24-hour notice to the City Engineering Department and/or Public Works Department prior to the proof roll test. The appropriately loaded dump truck shall either by provided by the Contractor/Developer/Owner along with a weight ticket, or the Contractor/Owner/Developer can

pay the City a fee of $500 for the City to provide the loaded dump truck. If the aggregate base course fails the proof- roll test and a representative of the City of Bryant has to perform another test, there will be a $250.00 fee for each additional proof-roll test which shall be paid by the Owner/Developer.

D. Density tests are required in accordance with **Table 9** and the latest edition of ARDOT standard specifications. Density tests on aggregate base course shall be taken every 200 CY or portion thereof with a minimum of 1 per lift, except that each cul-de-sac street shall have a minimum of two tests taken regardless of its length and all curve radii shall have a minimum of 3 tests taken. Compaction shall be in accordance with Section 5 of these specifications. The City Engineering Department and/or Public Works Department shall be notified at least 24 hours in advance of any density test(s). A representative of the City Engineering Department and/or Public Works Department shall be on-site to witness the test(s) unless instructed otherwise. Copies of all test results shall be sent to the City of Bryant Public Works.

E. Aggregate base course shall not be more than 1/4-inch less than specified thickness.

F. The aggregate base course shall meet all of the requirements of these specifications and shall be approved by the City Engineering Department and/or Public Works Department prior to asphalt being placed. Approval of the aggregate base course will be revoked if asphalt is not placed on the aggregate base course within 24 hours of approval, or if a rain event occurs within 24 hours of approval.

G. If the succeeding courses of asphalt are not within 24 hours after the aggregate base course has been prepared or before any rain event and it becomes rutted, rough, or unstable, the aggregate base course shall be shaped and re-compacted in accordance with these specifications and the latest edition of ARDOT standard specifications.

Changes and Reasons for Change:

1. Throughout: Street Department changed to City Engineering Department. AHTD changed to ARDOT. “Aggregate” added in front of Base Course.
2. Part C: added the highlighted language shown. Changed fee from $200 to $250.
    a. Reason: This language was developed based on discussions with City staff regarding previous issues on this topic. This requires proper notice prior to proof roll tests and specifies who is responsible for paying for/providing the proof roll test. Fee was increased to cover the city’s cost of providing another proof roll test.
3. Part D: Added the highlighted language shown. Some of this highlighted language was relocated from Section 9.2. 300 LF was changed to 200 CY, the requirement for three tests in curves was added.
    a. Reason: It is recommended to use a quantity-based measurement (200 CY) as opposed to a length-based measurement (300 LF) to account for different widths of roadways, intersections, etc.
4. Part F: added highlighted language

   a. Reason: Additional clarification. Once properly compacted, aggregate base course should be sealed with asphalt as soon as possible to avoid erosion of the aggregate, and water infiltration that may reduce the compaction level of the aggregate. This was a city identified historical deficiency.
5. Part G: Deleted “immediately” and replaced with “24 hours”. Added highlighted text.
   a. Reason: 24 hours is more clear and enforceable than “immediately”. The rain event requirement was added to ensure aggregate is not rained after city approval but prior to pacing asphalt.
6. Added Table 9 below
   a. Reason: This table consolidates all of the testing, sampling, and quality control criteria found in these standards into one, easy to read table. This table was mostly added for convenience to the reader. However, there are a few criteria that are found in this table that were not mentioned in the previous specifications. A few other municipalities in Arkansas have similar tables to enhance ease of use of these standards for quality control.

Table 9: Construction Quality Control

CONSTRUCTION QUALITY CONTROL					
Construction Stage	Test Required	Test Reference[a] AASHTO	ASTM	ARDOT	Frequency of Sampling and Testing
Subgrade					
	Sampling	T 87	D 421	---	One/Type of Soil
	Soil Classification	M 145	---	---	
	Sieve Analysis	T 88	D 422	---	
	Moisture-Density Relationship – Standard Proctor or	T 99	D 698	---	
	Moisture-Density Relationship – Modified Proctor	T 180	D 1557	---	
	Moisture & Density (In-Place)	T 310	D 6938	---	One/200 CY/8" Lift (Subgrade)[b]
				---	One/200 CY/8" Lift (Fill)
				---	One/Crossing/300 LF/6" Lift (Trench Backfill)[c]
				---	One/200 CY/6" lift (Structure Backfill)[c]
Aggregate Base Course					
	Aggregate Base Course				
	Sampling	T 2	D 75	---	One/Type of Aggregate
	Percentage of Wear	T 96	C 131	---	
	Soundness	T 104	C 88	---	
	Sieve Analysis	T 27	C 136	---	
	Moisture-Density Relationship	T 180	D 1557	---	
	Moisture & Density (In-Place)	T 310	D 6938	---	One/200 CY/8" Lift[b]
	Thickness	---	---	---	One/Crossing/300 LF/6" Lift (Trench Backfill)[c]
					One/200 CY/6" lift (Structure Backfill)[c]
	ACHM Base Course (Refer to ACHM Surfacing)				
Curb & Gutter					
	Portland Cement Concrete				
	Sampling	T 141	C 172	---	One/1000 LF of Curb & Gutter
	Slump	T 119	C 143	---	
	Temperature	---	---	---	
	Air Content	T 152	C 231	---	
	Cylinders	T 22/T 23	C 39/C 31	---	One Set (4)/1000 LF of Curb & Gutter
Asphalt Concrete Hot Mix (ACHM)					
	Aggregates				
	Sampling	T 2	D 75	---	One/Source of Material
	Percentage of Wear	T 96	C 131	---	
	Soundness	T 104	C 88	---	
	Sieve Analysis	T 27	C 136	---	
	Bituminous Mixture				
	Sampling	T 168	---	465	One/500 TN/Type of Mixture
	Air Voids (AV)	T269	---	---	
	Voids in Mineral Aggregate (VMA)	---	---	464	
	Water Sensitivity	---	---	455	
	Density – Maximum Theoretical	T 209	---	---	
	Density (Field)	T 166	---	461	See Section 9.2 C
	Thickness (Core)	---	---	---	
	Asphalt Binder Content	---	---	449/449A	One/500 TN[d,e]
	Aggregate Gradation	T 30	C 136	460	One/500 TN[d,e]
Portland Cement Concrete Pavement and Structures					
	Aggregates				
	Sampling	T 2	D 75		One/Source of Material
	Organic Impurities	T 21	C 40		
	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	---	Structures: One/100 CY
	Slump	T 119	C 143	---	Pavement: One/200 CY
	Temperature	T 309	C 1064	---	
	Air Content	T 152	C 231	---	
	Cylinders	T 22/T 23	C 39/C 31	---	Structures: One Set (4)/100 CY[e]
					Pavement: One Set (4)/200 CY[e]
	Thickness (Core)	T 24	C 42	---	See Section 9.2 D

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

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

[c] Trench and structure backfill tests are in addition to subgrade tests.

[d] Not less than one test per day.

[e] A minimum of one test required for each type of material or mixture.

[f] Structures includes concrete aprons and swales, drainage structures, driveways, sidewalks, etc.

10.0 EROSION CONTROL

10.1 GENERAL

A. Erosion control measures shall be provided during construction to minimize soil erosion and to prevent silting of utility and storm drainage structures. Erosion control shall meet the requirements of the City of Bryant Storm Water Management Manual, applicable ADEQ General Stormwater NPDES Permits, and any other required permits. The City of Bryant is designated as a MS4.

10.2 PERMANENT EROSION CONTROL

A. Permanent erosion control measures shall be solid sodding with a minimum of 4" of topsoil in all areas within rights-of-way and easements which are not covered by improvements.

10.3 PERMITS REQUIRED

A. Contractor shall obtain permits, if required, from the Arkansas Department of Environmental Quality and Corps of Engineers, United State Corps of Engineers, City of Bryant, or Arkansas Department of Transportation. Permits that may be required include, but not limited to, ADEQ short term activity authorization, ADEQ General Stormwater NPDES permit, USACE Nationwide permit, and USACE Section 404 Permit

Changes and Reasons for Change:

1. Section 10.1: Added highlighted text
    a. Reason: To clarify erosion control requirements and list other potential permit requirements related to erosion control.
2. Added Section 10.2
    a. Reason: Due to the small areas of permanent erosion control needed on urban projects, urban projects typically receive solid sodding for permanent erosion control as opposed to permanent seeding. This was added per discussions with City Staff.
3. Section 10.3: Added highlighted language shown.
    a. Reason: This includes more examples of entities that may require permits depending on the type of work being completed.

11.0 BICYCLE AND PEDESTRIAN FACILITIES

Changes and Reasons for Change:

1. Recommend changing Section title from “SIDEWALKS” TO “BICYCLE AND PEDESTRIAN FACILITIES”
    a. Reason: this section of the specifications was revised to include both sidewalks and trails.

11.1 GENERAL

A. Sidewalks and/or Shared-Use Trails shall be installed where shown on the Master Transportation Plan in accordance with those dimensions shown on cross-sections as found within the City Master Transportation Plan, and as provided within these standards.

B. All pedestrian and bicycle facilities shall be designed in accordance with American Disabilities Act (ADA) regulations, AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, AASHTO Guide for the Development of Bicycle Facilities, and the requirements of these Standards. Any variances from these requirements shall be in accordance with ADA requirements and shall be approved by the City Engineering Department prior to construction.

C. Sidewalks shall be on both sides of streets in line with sidewalks on opposite corners of roads.

D. Sidewalk and Trail cross slopes shall be a minimum of 1 percent and a maximum of 2%. The cross slope shall be towards the street unless otherwise approved.

E. Longitudinal slope of sidewalks and trails shall be consistent with the adjacent street slopes.

F. The subgrade under sidewalks shall be excavated or filled to the required grade. Soft and yielding material shall be removed and replaced with suitable material and the entire subgrade shall be thoroughly compacted with approved mechanical equipment. Sidewalks shall not be placed upon grassy or organic materials. Subgrade under sidewalks shall be compacted to 90 percent modified proctor density minimum. Density tests on subgrades shall be taken every 300 feet or portion thereof, or every lift, whichever is more often, and shall be witnessed by the City Engineering Department and/or Public Works Department. Compaction shall be in accordance with Section 6 of these specifications, except as modified in this section.

G. The subgrade under trails shall meet the requirements of Section 6.4

H. Sidewalks or trails which extend or link existing sidewalks or trails shall adjoin the existing sidewalks or trails to form a continuous, even pathway.

I. Utility poles, utility boxes, mailboxes, fire hydrants, and other similar obstructions shall not be located in sidewalks and trails. Sidewalk and trail location may vary at the discretion of the Public Works Department to avoid such obstacles.

J. Shared-use paved trails shall have a minimum centerline radius of 50 feet unless otherwise approved. All changes in horizontal alignment shall be curved and not have angle transitions.

K. Sidewalks and trails located outside public ROW shall be maintained by the Owner and not by the City of Bryant

Changes and Reasons for Change:

1. Part A: Moved *"Sidewalks shall be Portland Cement Concrete with a minimum 28-day compressive strength of 4,000psi."* to Part 11.3 "MINIMUM THICKNESS AND REINFORCEMENT".
    a. Reason: More appropriate context.
2. Added Part A
    a. Reason: to reference the requirements of the Master Transportation Plan.
3. Added Part B
    a. Reason: There are many requirements for proper sidewalk and trail design that are not listed in these standards. The guidelines added in Part B cover criteria necessary for adequate sidewalk and trail design.
4. Part D: Deleted *"All sidewalks including ramps shall meet all current Federal Americans with Disabilities (ADA) design guidelines or requirements."*
    a. Reason: This is included in the revised subpart B above.
5. Part D: Deleted "traverse slopes shall not exceed 2 percent." and replaced with highlighted language above.
    a. Reason: to provide and allowable range of cross slopes that facilitate proper drainage and are compliant with ADA regulations.
6. Added Part E
    a. Reason: This is an important criteria for pedestrian and bicycle mobility found in pedestrian and trail design guides that is reiterated here for clarity.
7. Part F: Added highlighted language.
    a. The previous standards did not provide enough criteria and clarity to result in proper subgrade under sidewalks. This language was added per a city identified historical deficiency.
8. Added Part G
    a. Reason: To clarify that the subgrade requirements under trails shall be consistent with the subgrade requirements under roads.
9. Part H: Added "or trails".
10. Added Part J
    a. Reason: According to national guidance, trails should have adequate Radii for the expected speed of travel on the trail. This typically results in Radii ranging from 50' to 120'. For simplification, 50' was listed as the minimum radius, but a larger radius can be used if appropriate.
11. Added Part K:
    a. Reason: Clarification based on city identified historical deficiencies.

11.2 ACCESSIBILITY

A. Wheelchair ramps shall be installed in accordance with current ADA requirements including the placement of detectable warning devices.

B. Accessible ramps shall be constructed where sidewalks and trails intersect a curb, commercial driveway, street, or alley. Width of ramp shall match width of adjoining sidewalk or trail.

C. Detectable warning device shall extend two (2) feet in the direction of travel and shall be the full width of the curb ramp or flush pedestrian access surface.

D. Detectable warning device shall be placed such that the domes align in the predominant direction of pedestrian travel.

E. Detectable warning device shall be located so that the nearest edge of the device is 6 inches from the face of curb.

F. Maximum slope of ramp shall be 8.33% in the direction of travel. Cross-slope shall not exceed 2%.

G. Sidewalk or Trail crossings of major roadways shall be required to have the appropriate pedestrian signal head or pedestrian hybrid beacon, roadway markings, and crosswalks per the recommendations of the MUTCD.

Changes and Reasons for Change:

1. Added Section 11.2
    a. Reason: All of these requirements are consistent with the requirements of the ADA regulations. The most commonly referenced requirements from these regulations were listed here for ease of use and clarity for the reader.

11.3 MINIMUM THICKNESS AND REINFORCEMENT

A. All sidewalks not within a driveway shall have a minimum thickness of four (4) inches. All sidewalks within a driveway shall be a minimum thickness of six (6) inches.

B. Sidewalks shall be reinforced, at a minimum, with woven wire fabric reinforcement.

C. Sidewalks shall be Portland Cement Concrete with a minimum 28-day compressive strength of 4,000psi.

D. Trail ACHM Pavement and aggregate base course shall be as shown in the typical cross section detail in these specifications. Concrete trails shall meet the same requirements as concrete for sidewalks and shall only be used with approval by the City Engineering Department and/or Public Works Department.

Changes and Reasons for Change:

1. Part A: Added highlighted language shown.
    a. Reason: to clarify that sidewalks within driveway limits have different thickness criteria.
2. Added Part D
    a. Reason: Criteria for trail pavement was not listed in the previous standards. Adding this subpart fixes this issue. Per City Staff, Asphalt trails are preferred to concrete trails.

11.4 MINIMUM WIDTH

A. Minimum width of pedestrian and bicycle facilities shall be as specified in the City of Bryant Master Transportation plan. Alternate widths may be required by the City Engineering Department and/or Public Works Department.

Changes and Reasons for Change:

1. Deleted *"Minimum width shall be 4 feet for residential streets and 5 feet for local 1, local 2, collector, and arterial streets."* and replaced with the highlighted language shown.
    a. Reason: This standard was updated for consistency with the Master Transportation Plan. Per the Master Transportation Plan, the minimum widths vary based on the type of facility.

11.5 CONTRACTION AND EXPANSION JOINTS

A. Contraction joints shall be provided perpendicular to the sidewalk at intervals equal to the sidewalk width.

B. Expansion joints shall be constructed perpendicular to the sidewalk at intervals equal to five times the sidewalk width. Expansion joints shall be made with 1/2-inch preformed expansion joint filler of a non-extruding type. Expansion joints shall be placed at driveways, drop inlets, and curbs.

11.6 QUALITY CONTROL TESTING AND INSPECTION BY CITY OF BRYANT

A. Subgrade and formwork for sidewalks and trails shall be inspected by the City Engineering Department and/or Public Works Department prior to pouring of the sidewalk or trail.

B. All testing of materials and construction shall be provided and paid for by the Developer/Owner.

C. All field tests required for a project shall be witnessed by the City Engineering Department and/or Public Works Department.

D. All testing shall be accomplished by a testing firm approved by the City Engineering Department and/or Public Works Department and shall be performed under the supervision of a licensed Professional Engineer.

E. Sampling and testing locations shall be subject to approval by the City Engineering Department and/or Public Works Department.

F. Density tests on sidewalk subgrades shall be taken every 300 feet or portion thereof, or every lift, whichever is more often, and shall be witnessed by the City Engineering Department and/or Public Works Department. Compaction shall be in accordance with Section 6 of these specifications, except as modified in this section.

G. The City Engineering Department and/or Public Works Department shall be notified at least 24 hours in advance of the need to inspect subgrade and formwork of sidewalks and trails.

Changes and Reasons for Change:

1. Throughout: Changed Street Department to City Engineering Department. Added “and trails” where appropriate.
2. Part F: Added highlighted language.
    a. Reason: For clarification that density test should also be required every lift and shall be witnessed by the city.
3. Part G: Changed 1 day to 24 hours
    a. For clarification purposes.

Changes to Appendix A – Standard Details

DETAILS 1 – 6: Recommend Deleting details 1 -6 and replacing with Details 1 -5 as shown. The street details were determined to be outdated with current city ordinances and not in line with current state and federal design guides. The following issues were noted:

1. Street classifications do not match Master Transportation Plan.
2. Street details show lane widths, right-of-way widths, buffer widths, and sidewalk widths that do not match the Master Transportation Plan. Since Master Transportation Plan widths can vary depending on specific components included, it is recommended to not list specific widths on the standard details.
3. Street details show pavement thickness. As described in Section 6.0 “PAVEMENT DESIGN” of this document, it is not recommended to have preset thicknesses for collector and arterial streets due to a number of different variables that can affect the required thickness.
4. Trail standard details were not included in the previous standards.
5. Profile grade is not labeled correctly in the previous standards.
6. Cross slopes are not labeled in the previous standards.

The new details 1-5 address these issues. There are 4 main street classifications within the Master Transportation Plans: Minor Arterial, Collector, Industrial Collector, and Local. Each classification has multiple different configurations that may be required by Public Works or Engineering Department. Due to the large number of potential variations, specific typical sections were not made for every possible configuration; only the four main classifications. The width dimensions were labeled with generic information where possible and footnotes direct the reader to the Master Transportation Plan for specific dimensions. The sections are shown without trails or sidewalks, but a match line is referencing an “end conditions” detail that shows details for trails and sidewalks when required by the Master Transportation Plan.

Detail 6: The previous detail for curb and gutter detailed two types of curb. One was an upright curb that is essentially identical to ARDOT’s Type A curb, and the other is a sloped curb that is not commonly used. After discussions with the city on the most commonly used curbs, it is recommended to retain the upright curb and label it Type A, and delete the sloped curb that is not commonly used by the city. It is also recommended to add a 4” high mountable curb for use on islands where mountable design is required. This curb was labeled Type B. It is also recommended to a add a modified 2” curb for use across driveways where necessary. Variable depth and width dimension are also shown to allow site specific design.

Detail 7: (previously detail 8) Minor revisions were made to this detail per city comments. These changes include a “compacted subgrade at 95%” callout, a section reference for “depth varies” dimension, and deleting the “compacted undisturbed earth” callout.

Detail 8: (previously detail 9) Minor revisions were made to this detail per city comments. These changes include a “compacted subgrade at 95%” callout, a section reference for “depth varies” dimension, changing the thickness of the concrete to 8”, and changing the Welded Wire Fabric W-number from 1.4 to 2.9 to increase the gauge of wire.

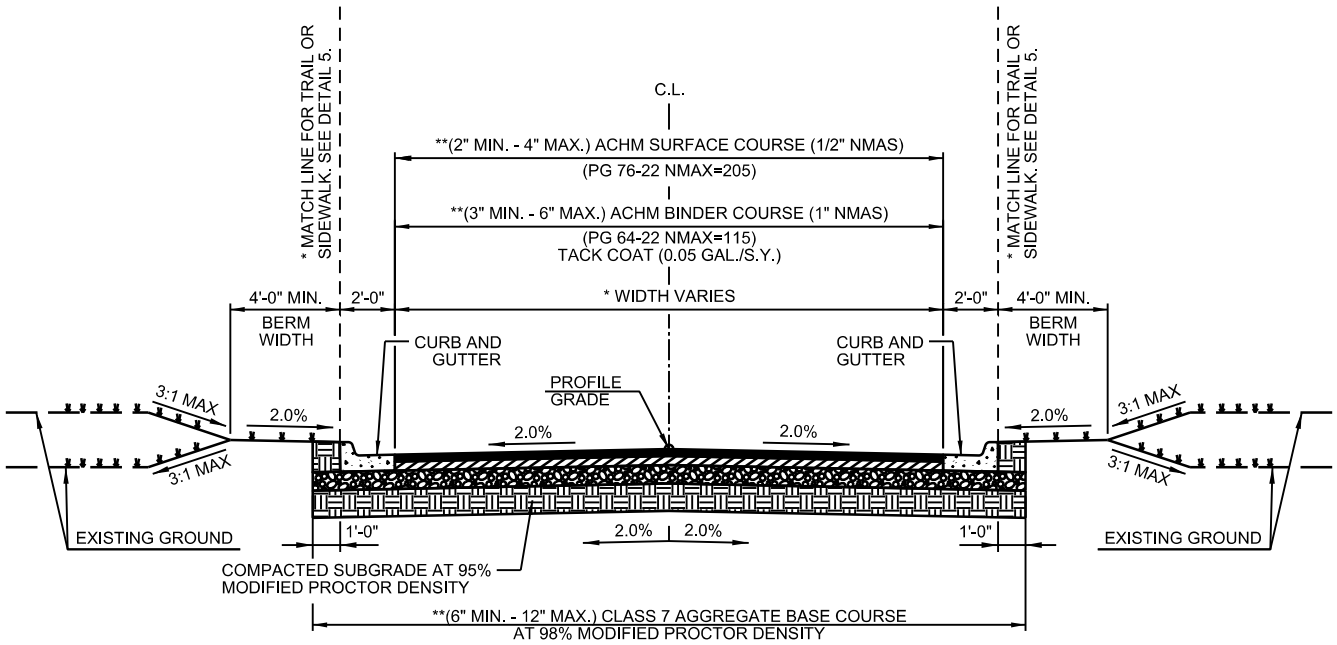
Detail 9: (previously detail 10) Minor revisions were made to this detail per city comments. These changes include a “compacted subgrade at 95%” callout, a section reference for “depth varies” dimension, changing the thickness of the concrete to 8”, changing the Welded Wire Fabric W-number from 1.4 to 2.9 to increase the gauge of wire, adding dowel bars as requested by the city at the joint between existing and new concrete, and updating the saw cut/expansion joint callouts.

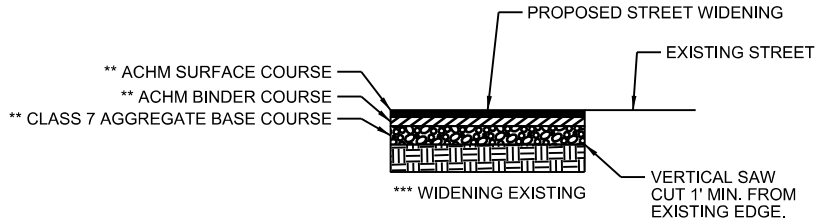
Detail 11: Recommend deleting the bike lane pavement marking detail. A dimensioned version of this detail is shown in the MUTCD (available for free online) and includes spacing and placement requirements. This detail has been referenced in Part 5.9 “PAVEMENT MARKINGS”.

THE SECTION THAT FOLLOWS INCLUDES THE NEW STANDARD DETAILS FOLLOWED BY THE PREVIOUS STANDARD DETAILS FOR COMPARISON.

APPENDIX A

REVISED





GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE - MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.
4. ACHM BASE COURSE (4" MIN. - 12" MAX) (1 1/2" NMAS) MAY BE USED IF INCLUDED IN AN APPROVED PAVEMENT DESIGN.

* CROSS SECTIONS AND RIGHT-OF-WAY SHALL ADHERE TO THE MINIMUM WIDTH REQUIREMENTS SHOWN IN THE CITY OF BRYANT MASTER TRANSPORTATION PLAN. THE DEVELOPMENT REVIEW COMMITTEE SHALL DETERMINE WHICH VERSION OF STREET CLASSIFICATION AND WHAT WIDTHS WILL BE REQUIRED.

** THICKNESS TO BE DETERMINED BY PAVEMENT DESIGN IN ACCORDANCE WITH SECTION 5.0 OF THE MINIMUM STANDARD SPECIFICATIONS FOR STREETS.

*** PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

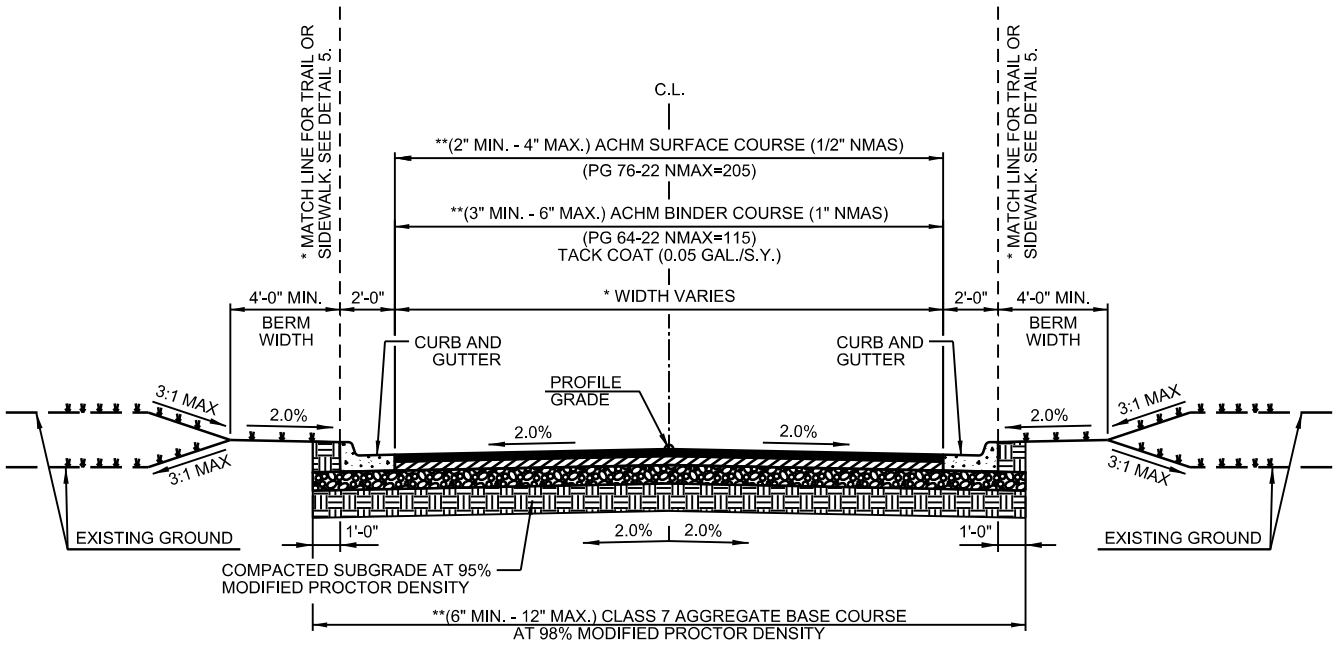
CITY OF BRYANT

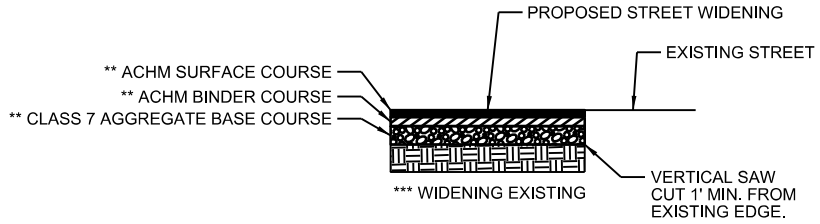
TYPICAL SECTION
MINOR ARTERIAL

DETAIL 1

ISSUE DATE
AUGUST 2021

REVISION DATE





GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE - MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.
4. ACHM BASE COURSE (4" MIN. - 12" MAX) (1 1/2" NMAS) MAY BE USED IF INCLUDED IN AN APPROVED PAVEMENT DESIGN.

* CROSS SECTIONS AND RIGHT-OF-WAY SHALL ADHERE TO THE MINIMUM WIDTH REQUIREMENTS SHOWN IN THE CITY OF BRYANT MASTER TRANSPORTATION PLAN. THE DEVELOPMENT REVIEW COMMITTEE SHALL DETERMINE WHICH VERSION OF STREET CLASSIFICATION AND WHAT WIDTHS WILL BE REQUIRED.

** THICKNESS TO BE DETERMINED BY PAVEMENT DESIGN IN ACCORDANCE WITH SECTION 5.0 OF THE MINIMUM STANDARD SPECIFICATIONS FOR STREETS.

*** PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

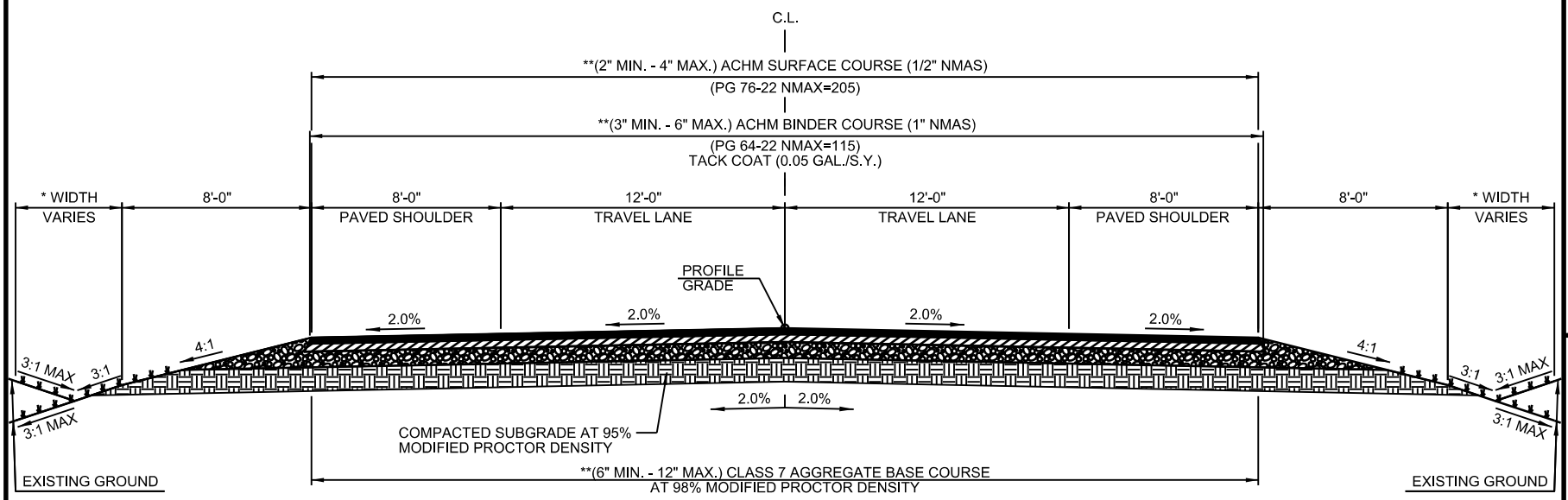
CITY OF BRYANT

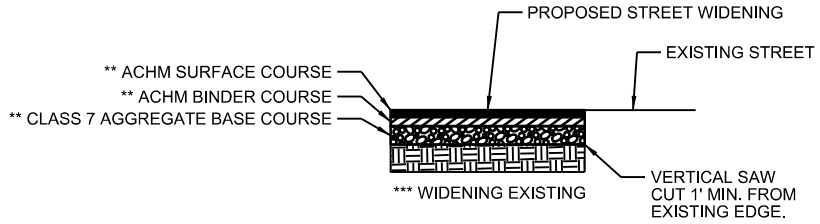
TYPICAL SECTION COLLECTOR STREET

DETAIL 2

ISSUE DATE AUGUST 2021

REVISION DATE





GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE - MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.
4. ACHM BASE COURSE (4" MIN. - 12" MAX) (1 1/2" NMAS) MAY BE USED IF INCLUDED IN AN APPROVED PAVEMENT DESIGN.

* ROADSIDE DITCHES SHALL BE DESIGNED TO COMPLY WITH THE CITY OF BRYANT STORM WATER MANAGEMENT MANUAL.

** THICKNESS TO BE DETERMINED BY PAVEMENT DESIGN IN ACCORDANCE WITH SECTION 5.0 OF THE MINIMUM STANDARD SPECIFICATIONS FOR STREETS.

*** PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

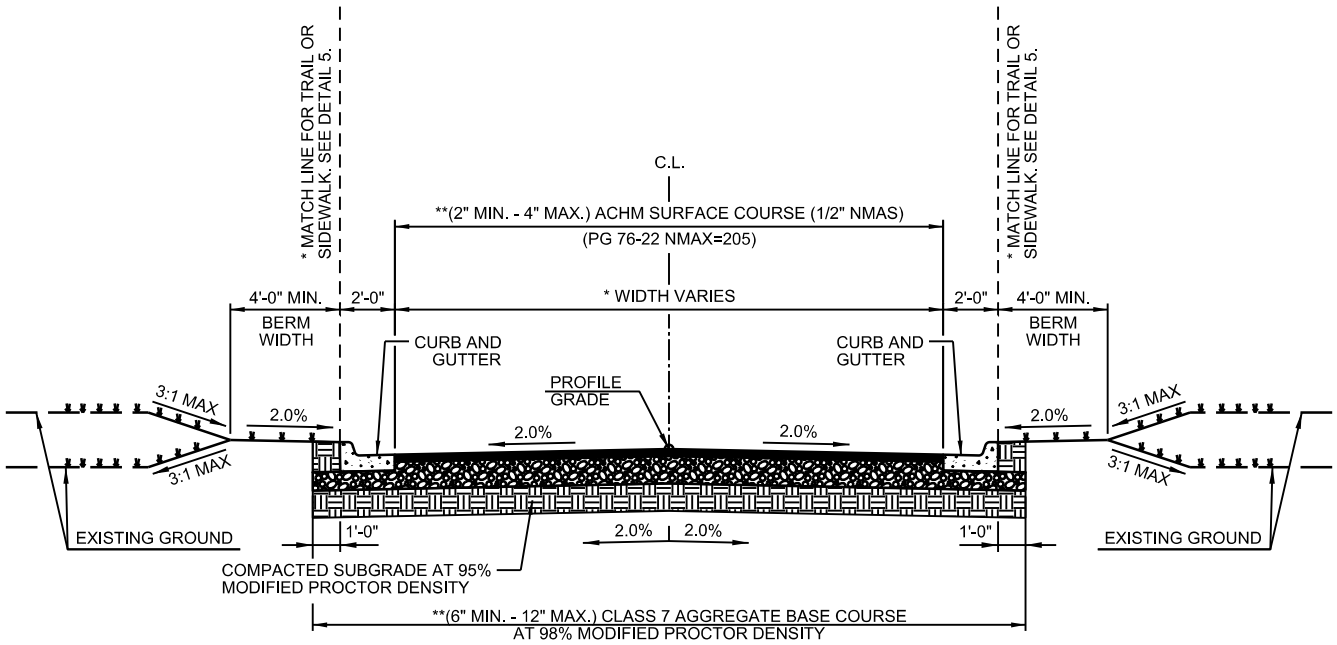
CITY OF BRYANT

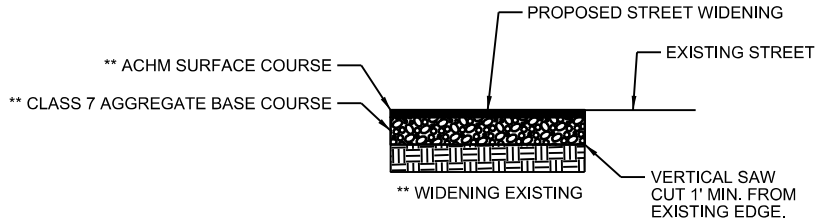
TYPICAL SECTION
INDUSTRIAL COLLECTOR
STREET

DETAIL 3

ISSUE DATE
AUGUST 2021

REVISION DATE





GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE - MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.

* CROSS SECTIONS AND RIGHT-OF-WAY SHALL ADHERE TO THE MINIMUM WIDTH REQUIREMENTS SHOWN IN THE CITY OF BRYANT MASTER TRANSPORTATION PLAN. THE DEVELOPMENT REVIEW COMMITTEE SHALL DETERMINE WHICH VERSION OF STREET CLASSIFICATION AND WHAT WIDTHS WILL BE REQUIRED.

** THICKNESS TO BE DETERMINED BY SECTION 6.5 AND TABLE 8 OF THE MINIMUM STANDARD SPECIFICATIONS FOR STREETS.

*** PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

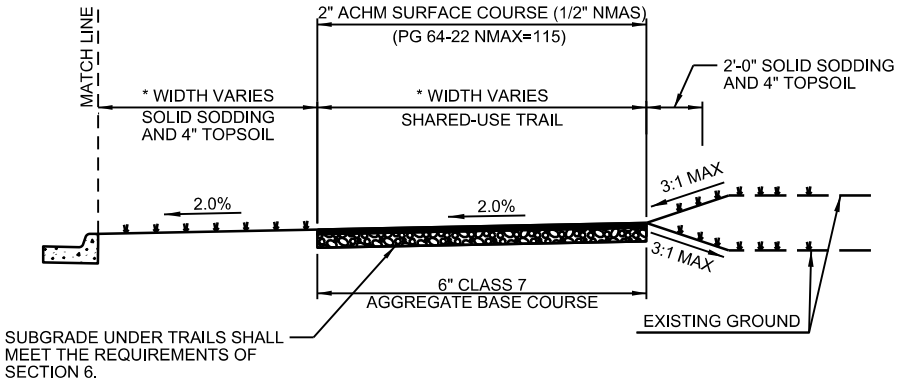
CITY OF BRYANT

TYPICAL SECTION
LOCAL STREET

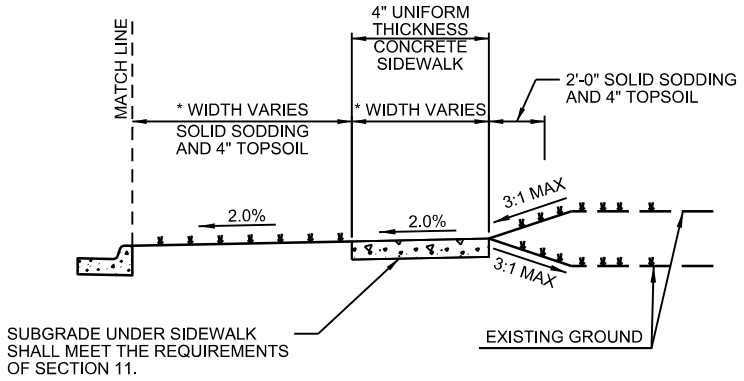
DETAIL 4

ISSUE DATE
AUGUST 2021

REVISION DATE



SHARED-USE TRAIL END CONDITION



SIDEWALK END CONDITION

* WIDTH SHALL ADHERE TO THE MINIMUM WIDTH REQUIREMENTS SHOWN IN THE CITY OF BRYANT MASTER TRANSPORTATION PLAN. THE DEVELOPMENT REVIEW COMMITTEE SHALL DETERMINE WHICH VERSION OF STREET CLASSIFICATION AND WHAT WIDTHS WILL BE REQUIRED.

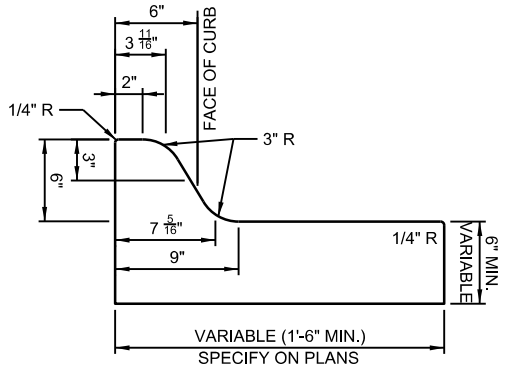
CITY OF BRYANT

TYPICAL SECTION
END CONDITIONS

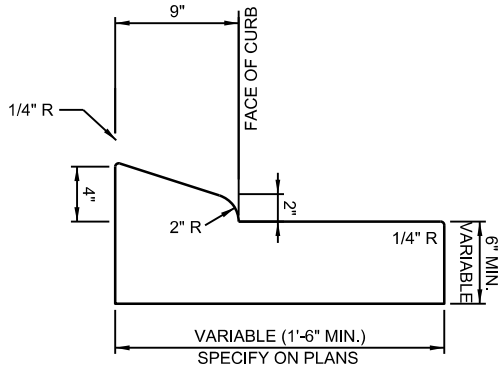
DETAIL 5

ISSUE DATE
AUGUST 2021

REVISION DATE



TYPE A



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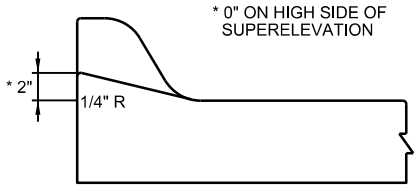


NOTE: THIS DETAIL SHALL ONLY BE USED ACROSS DRIVEWAY ENTRANCES.

MODIFIED CURB

GENERAL NOTES

1. ALL CURB AND GUTTER SHALL BE TYPE A, UNLESS OTHERWISE APPROVED BY THE PUBLIC WORKS DEPARTMENT OR CITY ENGINEER.
2. TYPE B CURB MAY BE USED FOR ISLANDS OR MEDIANS THAT ARE INTENDED TO BE MOUNTABLE BY VEHICLES, AND IS SUBJECT TO APPROVAL BY THE PUBLIC WORKS DEPARTMENT OR CITY ENGINEER.
3. MODIFIED CURB MAY BE USED ACROSS DRIVEWAY ENTRANCES.

CITY OF BRYANT

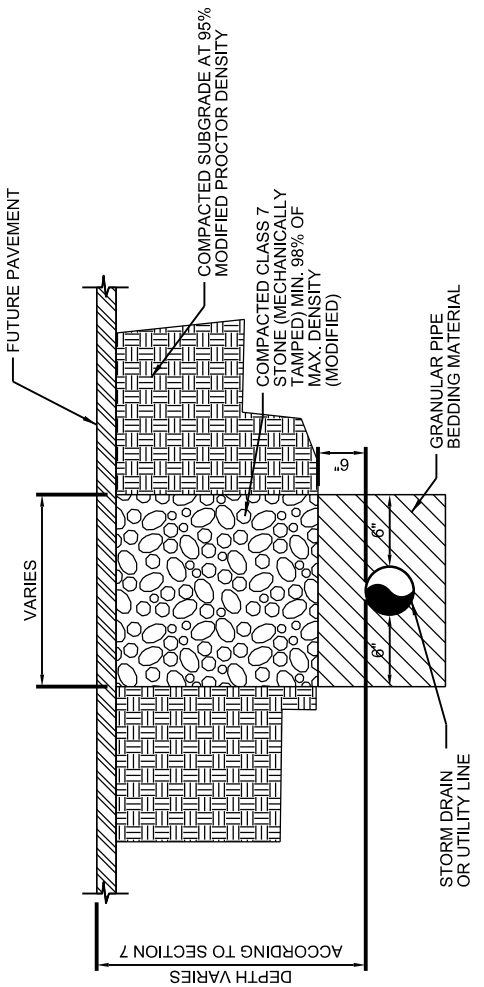
CURB & GUTTER SECTIONS

DETAIL 6

ISSUE DATE
AUGUST 2021

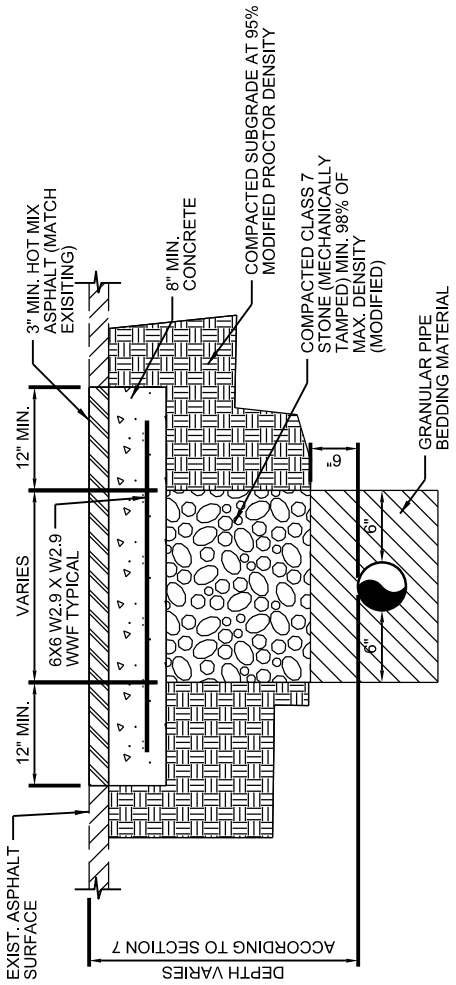
REVISION DATE

CITY OF BRYANT	TYPICAL SECTION DRAINAGE AND UTILITY CUT BACKFILL ON STREET UNDER CONSTRUCTION	ISSUE DATE **AUGUST 2021**	REVISION DATE
		DETAIL 7	

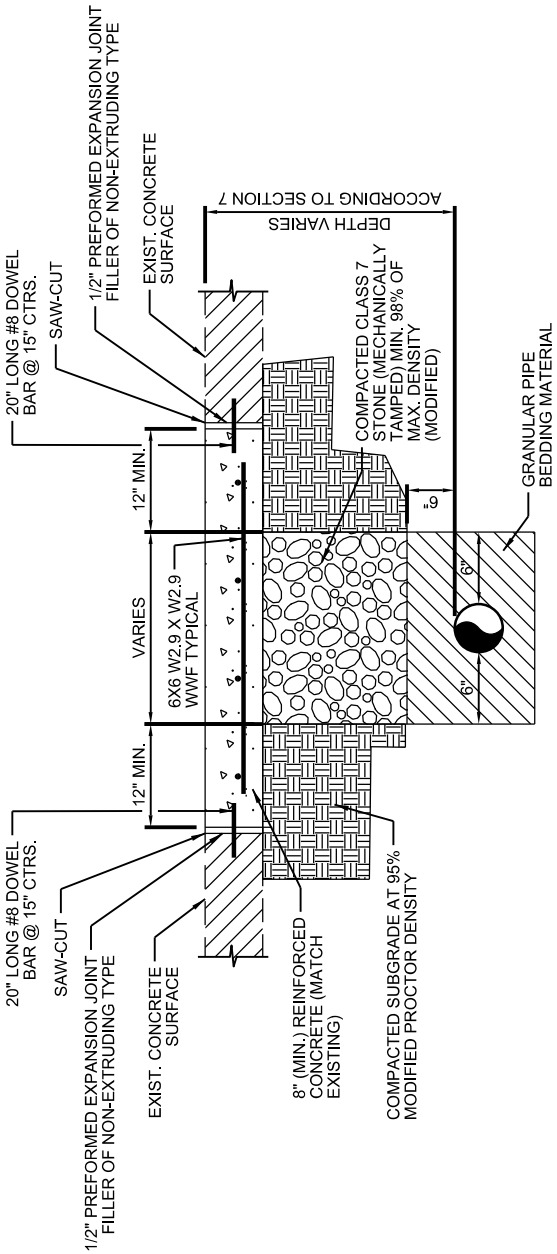


Note: This Backfill Procedure Shall Be Utilized For All Trenches Excavated In Area To Be Paved

CITY OF BRYANT	TYPICAL SECTION ASPHALT PAVEMENT REPAIR ON EXISTING STREET	ISSUE DATE **AUGUST 2021**	REVISION DATE
		DETAIL 8	



CITY OF BRYANT	TYPICAL SECTION CONCRETE PAVEMENT REPAIR ON EXISTING STREET	ISSUE DATE AUGUST 2021	REVISION DATE
		DETAIL 9	



APPENDIX A

STANDARD DETAILS

FROM PREVIOUS
STANDARDS

GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE – MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.
4. CONCRETE SIDEWALK SHALL BE A MINIMUM OF 4' WIDE IN RESIDENTIAL SUBDIVISIONS

* NOTES: PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

CITY OF BRYANT

TYPICAL SECTION
LOCAL 1 / RESIDENTIAL STREET

DETAIL 1

Issue Date
APRIL 2013

Revision Date

A1

WIDENING EXISTING *

GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE – MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.

* NOTES: PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

CITY OF BRYANT

TYPICAL SECTION LOCAL 2 STREET

Issue Date: APRIL 2013

Revision Date

DETAIL 2

A2

WIDENING EXISTING *

GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE – MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.

* NOTES: PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

CITY OF BRYANT

TYPICAL SECTION COLLECTOR STREET

Issue Date
APRIL 2013

Revision Date

DETAIL 3

A3

WIDENING EXISTING *

GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE – MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.

* NOTES: PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

CITY OF BRYANT

TYPICAL SECTION
RURAL COLLECTOR
STREET

DETAIL 4

Issue Date
APRIL 2013

Revision Date

A4

WIDENING EXISTING *

GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE – MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.

* NOTES: PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

CITY OF BRYANT

TYPICAL SECTION
INDUSTRIAL
COLLECTOR STREET

DETAIL 5

Issue Date
APRIL 2013

Revision Date

A5

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GENERAL NOTES

1. IN AREAS TO RECEIVE BITUMINOUS PAVING, CONCRETE DRIVEWAYS OR CURB AND GUTTER, SUBGRADE SHALL BE COMPACTED TO A DENSITY NOT LESS THAN 95% OF MAXIMUM MODIFIED DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT.
2. FOR AREAS OF SUBGRADE PREPARATION TO RECEIVE CONCRETE SIDEWALKS, SUBGRADE SHALL BE COMPACTED TO DENSITY OF 90% MAXIMUM MODIFIED DENSITY.
3. CRUSHED STONE – MATERIAL IN EACH COURSE SHALL BE COMPACTED TO A DENSITY OF 98% MAXIMUM MODIFIED DENSITY.

* NOTES: PAVEMENT RECONSTRUCTION TO CENTERLINE IS REQUIRED WHEN EXISTING STREET DOES NOT MEET THESE STANDARDS.

CITY OF BRYANT

TYPICAL SECTION MINOR ARTERIAL

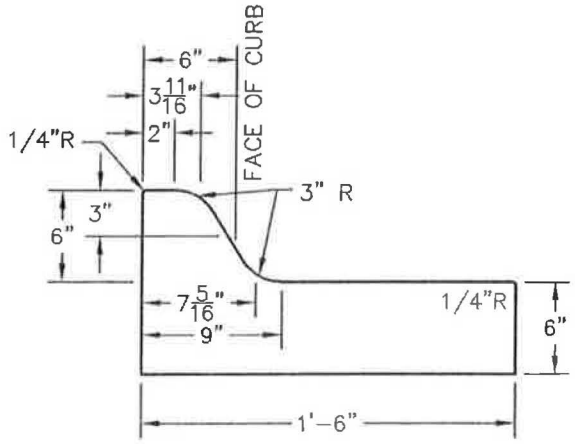
DETAIL 6

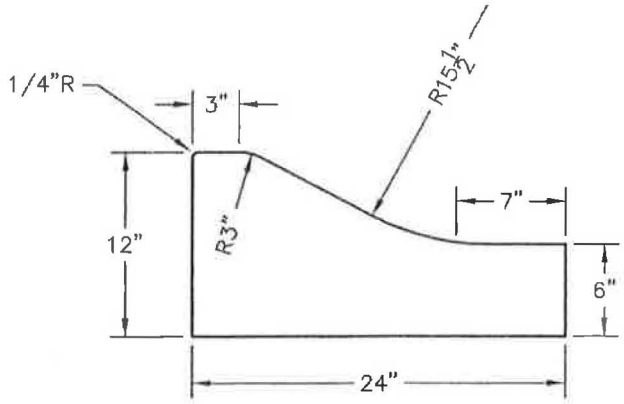
Issue Date: APRIL 2013

Revision Date

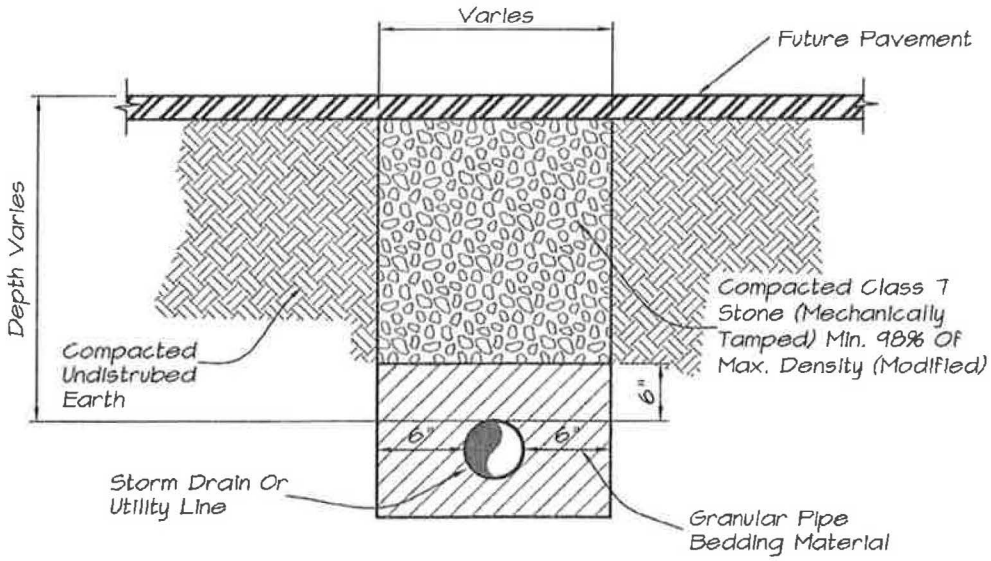
A6

CITY OF BRYANT	CURB & GUTTER SECTIONS	Issue Date APRIL 2013	Revision Date
		DETAIL 7	



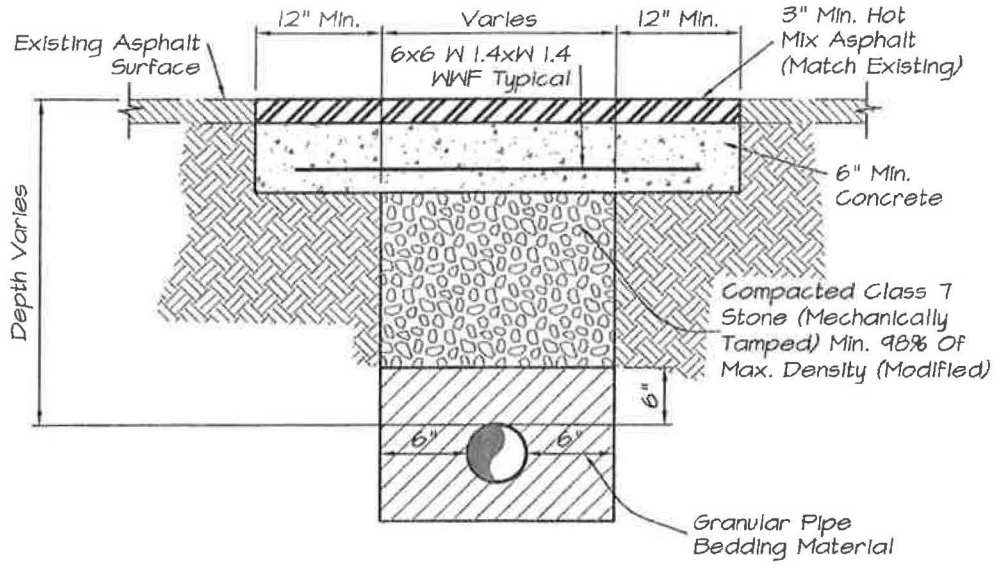


CITY OF BRYANT	TYPICAL SECTION DRAINAGE AND UTILITY CUT BACKFILL ON STREET UNDER CONSTRUCTION	Issue Date APRIL 2013	Revision Date
		DETAIL 8	

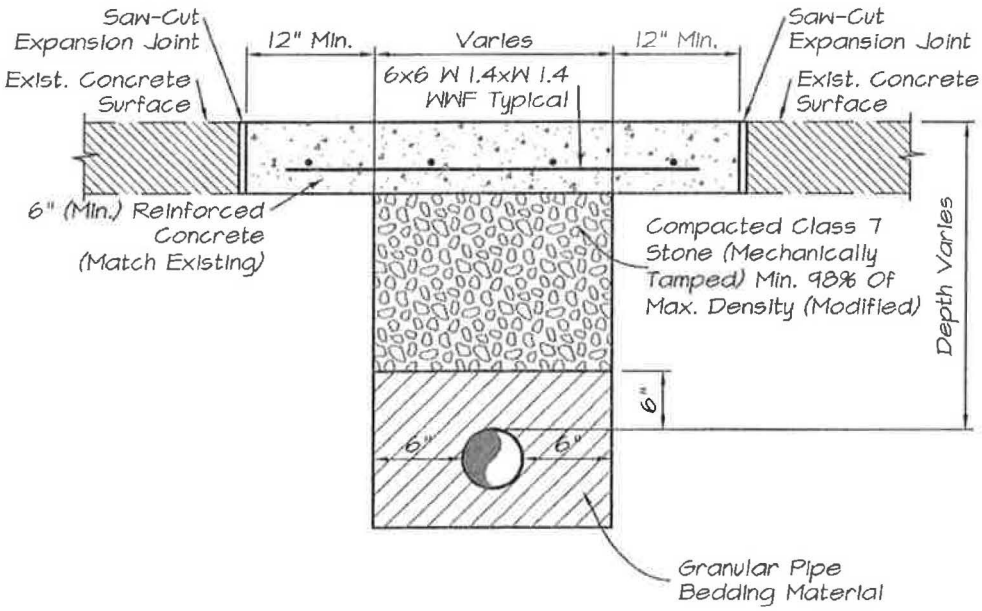


Note: This Backfill Procedure Shall Be Utilized For All Trenches Excavated In Area To Be Paved

CITY OF BRYANT	TYPICAL SECTION ASPHALT PAVEMENT REPAIR ON EXISTING STREET	Issue Date APRIL 2013	Revision Date
		DETAIL 9	



CITY OF BRYANT	TYPICAL SECTION CONCRETE PAVEMENT REPAIR ON EXISTING STREET	Issue Date APRIL 2013	Revision Date
		DETAIL 10	



CITY OF BRYANT	BIKE LANE PAVEMENT MARKING	Issue Date APRIL 2013	Revision Date
		DETAIL 11