ARTICLE 4 – SUBDIVISION ROAD AND BRIDGE DESIGN CRITERIA

DIVISION 4-100 PURPOSE AND INTENT

This ARTICLE 4 sets forth minimum standards for subdivision road and bridge design in Johnson County, and is intended for use by design engineers, developers and the public. This ARTICLE establishes minimum criteria for design and construction of subdivision roadways in the County to be used by the traveling public that assure their health, safety and welfare.

Subdivision roads shall be designed according to their functional classification and ADT. Roads will be designed by the methods defined in the COUNTY ROAD FUND MANUAL (CRFM), March, 2000 or the latest edition. The Planning and Zoning Commission will make a recommendation which design Standards apply to any given subdivision road.

To estimate the road ADT, the ITE Trip Generation 7th Edition or the latest edition shall be used. If actual road counts are available, they may be used as current data. All subdivision roads shall be designed for the total number of lots at complete build-out. Additional capacities may be required for any road that has a high potential to serve future adjacent development.

In calculating ADT for single-family residential development, developers shall use only Table 210 (Single Family Detached Housing/average weekday traffic) in the ITE Trip Generation Manual 7th Edition or the latest edition. No adjustment factors shall be allowed for this rate.

The applicable specifications of agencies or organizations listed in Appendix B are made a portion of these Standards by reference, and shall be the latest edition or revision thereof.

All subdivision roads shall be designed by a registered Engineer in the state of Wyoming qualified in road design.

SECTION 4-105 REQUIREMENTS

Road systems providing access to lots within subdivisions shall be designed and constructed as specified in these Standards. As a condition of approval of any subdivision, the applicant shall be required to agree to provide the following:

1. Construction of all new roads and bridges shown on the final construction drawings in accordance with these Standards.

2. Construction of roads outside the subdivision necessary to establish a connection between the subdivision and the existing public road system shall be in accordance with these Standards.

3. Where existing roads provide access between the subdivision and the state or county highway system and the existing roads do not meet Johnson County Road Standards for the traffic volumes which would occur once the subdivision is developed, the existing roads shall be upgraded in accordance with these Standards for the projected traffic volume, at the cost of the developer.

4. All improvements necessary for road drainage and irrigation including, but not limited to, culverts, drainage pans, inlets, curbs and gutters.

5. Traffic control devices including signs and signals, street/road name signs, road lighting, striping and pedestrian crosswalks shall be in conformance with the criteria contained in "The Manual on Uniform Traffic Control Devices for Streets and Highways" as adopted by the State of Wyoming pursuant to W.S. §31-5-112 and these Standards.
All subdivision roads shall have a stop sign at the intersection of the subdivision road and any public road. The stop condition shall be on the subdivision road.

All costs associated with installation including materials, parts and labor, will be the responsibility of the developer.

6. Road medians and median landscaping, if required.

7. Public driveways.

8. All subdivisions with four (4) or more lots shall have a minimum of two roads or a loop road for ingress and egress, unless a single road, if used, is 200 feet in length or less.

9. Cul-de-sacs or other authorized turn-around facilities shall be in accordance with requirements specified in DIVISION 4-500.

10. Where roads are temporarily dead-ended in anticipation of future expansion, a temporary turnaround shall be constructed in accordance with the IFC, as discussed in DIVISION 4-500.

11. Mail Box turnouts and supports, as shown in Figure 4-3 and Figure 4-4.

12. School bus turnouts as required by the Planning and Zoning Commission, as shown in Figure 4-5.

13. Required dedications and easements:

Upgrading of roads:

(i) Existing roads: Where the area to be subdivided includes an existing public road and the right-of-way for the road is insufficient to meet these Standards, or the right-of-way for the road has not been dedicated as a public right-of-way, and the road is intended to provide access to the lots in the subdivision, the applicant must obtain the necessary right-of-way and then dedicate the right-of-way to the County as part of the platting of the subdivision and the road shall be built to these Standards, at applicant's expense.

(ii) Compliance with plans: When any County or municipality adopted land use or transportation plan indicates plans for the establishment, realignment or widening of a road which traverses the area to be subdivided, the applicant must dedicate the necessary right-of-way for the establishment, realignment or widening of the road at the request of the County or appropriate municipality.

(iii) Connections to existing road system: Where roads outside a subdivision must be constructed to establish a connection between the subdivision and the existing public road system, or existing roads which will be used for such connection need to be upgraded to meet these Standards for the added traffic from the subdivision, the applicant must obtain the necessary right-of-way for these improvements and must plat them as dedicated right-of-way and build said road to these Standards, at applicant's expense.
SECTION 4-110 GENERAL DESIGN ELEMENTS

1. Design speed: The selection of design speed is influenced principally by the character of terrain, traffic volumes and appropriate range of design speeds for each road classification. Design speed shall be selected by the design engineer and approved by the Planning and Zoning Commission, prior to beginning the road design.

2. Surfacing requirements:

   (i) Roads with ADT greater than 400 shall be paved.
   (ii) Roads with ADT greater than 200 and less than 400 with a design speed greater than 30 mph shall be paved.
   (iii) Roads with ADT greater than 200 and less than 400 with a design speed of 30 mph or less shall either be paved or graveled with a minimum of six (6) inches of approved crushed base gravel.
   (iv) Roads with ADT greater than 100 and less than 200 with a design speed greater than 30 mph shall either be paved or graveled with a minimum of six (6) inches of approved crushed base gravel.
   (v) All streets for commercial and industrial subdivisions shall be paved.

Note: See Division 4-600 for gravel and paving surfacing requirements.

3. Right-of-Way: The minimum right-of-way widths required for each road classification are shown in Table 4-1. Additional right-of-way may be required for drainage improvements, cuts or fills, intersections, curb returns, snow storage and other road appurtenances.

<table>
<thead>
<tr>
<th>ADT</th>
<th>MINIMUM RIGHT-OF-WAY WIDTH</th>
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<tr>
<td>&lt; 250</td>
<td>50 feet</td>
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<tr>
<td>≥ 250</td>
<td>60 feet</td>
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</table>

TABLE 4-1

SECTION 4-115 ROADWAY DESIGN

Alignment: The major considerations in alignment design are safety, grade, profile, road width, design speed, sight distance, topography, drainage, and the maneuverability, braking and performance of heavy-duty vehicles. Alignment should provide for safe and continuous operations at a uniform design speed. Consideration should be given to locating roads so as to obtain a southern exposure wherever possible to avoid drifting of snow. Road layout should bear a logical relationship to existing or platted roads in adjacent properties and to the principles of good engineering practice.

1. Horizontal Alignment shall be per CRFM as determined by ADT and the functional classification.

2. Vertical Alignment shall be per CRFM as determined by ADT and the functional classification.
SECTION 4-120 GEOMETRIC CROSS SECTION

Superelevation: To account for snow and ice conditions, which occur frequently in Johnson County, the maximum superelevation will be limited to six percent (6%). The axis of rotation of roadway is the centerline.

Superelevation Transition: Superelevation transition is the progression of the roadway from the normal crown section to a fully superelevated section. To meet the requirements of safety, the length required to effect the transition shall be as described in the AASHTO’s “A Policy on Geometric Design of Highways and Streets”, Chapter 3, Transition Design Controls.

Width: All roads widths shall be in accordance with the standards specified in the County Road Fund Manual (See figure 4-2). However, no subdivision road shall have a traveled way narrower than 20 feet in width. Shoulders shall have the same surfacing material and thickness as the traveled way. The developer’s engineer shall certify in writing that the subdivision road has been designed in accordance with these standards.

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* SURFACING TAPER MUST BE 1V:6H OR FLATTER

FOR SUBDIVISION STREETS

NOT TO SCALE

FIGURL 4-2

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SECTION 4-125 CULVERTS

Use of culverts at access points to roads: Driveways or road connections to a County road shall not be constructed in such a way as to impede the normal flow of drainage in roadside ditches, culverts, drains, bridges or other drainage works, or to cause such drainage to flow onto or across the driving surface of a County Road. In the event such an impediment results in damage to a County road, the Road and Bridge Department may remove the impediment and bill the responsible party for the costs of repairs to the road, including labor, equipment and materials.

The minimum size of culvert is 18 inches in diameter or equivalent.
Culverts are required where driveways connect to County roads unless specifically exempted by the Department and these Standards. It is the responsibility of the responsible parties to maintain their culverts free and clear of silt, mud, debris and ice.

In certain instances, a culvert may not be required by virtue of the topography. In that event, a waiver must be obtained from the Department. The waiver, if granted, will be noted on the ROW Permit. Such a waiver does not constitute a waiver of the ROW Permit, inspection of the access, or any other requirements of the access.

Culverts shall be located at each natural draw or watercourse as conditions warrant to prevent excessive accumulation of flow in roadside ditches or along the toe of slopes.

Culverts under all roads shall be designed to accommodate the following design storm frequency runoff: one hundred (100) year for bridges, twenty five (25) year for culverts on roads with an ADT of more than one hundred (100) and ten (10) year for roads with less than one hundred (100) ADT.

Storm runoff estimates shall be determined by any of the following methods:

1. Runoff from stream flow records
2. Tabular method as per Technical Release MO55 from the Engineering Division of the U.S. Department of Agriculture
3. HEC-1 Computer Program from the U.S. Army Corps of Engineers
4. SCS Method
5. The Rational Method for small basins
6. Other methods as approved by the Planning and Zoning Commission.

The culvert shall slope downward in the direction of natural flow and be designed to be self-cleaning whenever possible. The outlet shall be designed not to discharge on unprotected fills or unstable material, or at adverse angles to streams or open channels. Headwalls, riprap or other means of protection will be required at inlets or outlets where erosion will occur.

The structural capacity of the pipe shall be properly designed to handle HS20-44 loads.

When a battery of pipes is used, a clear spacing of one-half (1/2) the pipe diameter (one (1) foot minimum, four (4) foot maximum) must be provided between pipes. Maximum and minimum cover, pipe metal gauge and strength classification shall be as specified by the culverts manufacturer.

Cleanout access shall be provided at least every four hundred (400) feet. Cleanout access shall also be provided at each angle point and at each change in grade. Manholes shall be used for clean outs and access points.

SECTION 4-130 OPEN CHANNELS AND DITCHES

Channels and ditches shall be designed to avoid roadside safety hazards. Open channels and ditches shall be designed to prevent erosion and to have adequate capacity for the anticipated flows.

SECTION 4-135 SIDE SLOPES

Preferred fore slope is 6H:1V; back slope is 3H:1V.
Any slope designed steeper than 2H:1V shall be certified for stability by a registered Engineer in the state of Wyoming qualified in soils analysis. Where heavy snowfall is expected, flatter slopes in cuts on the southern side of the roadway should be used to provide maximum exposure to the sun. Flatter slopes should be used wherever possible to reduce erosion, decrease maintenance costs, facilitate plant growth, and provide for safer operation.

Transition slopes shall be provided between adjoining cuts and fills, and shall be designed for pleasing appearance.

Where the side slopes of the original ground approach 1.5H:1V, the embankment shall be contained with a suitable retaining wall. Side slopes in rock will be based on the stability of the formation. Benching of side slopes should be used sparingly and only where justified by sound engineering reasons, including the following:

1. To stabilize material where benching is more economical than flattening
2. To intercept drainage in long and deep cuts
3. To intercept and store loose material

DIVISION 4-200 BRIDGE DESIGN

SECTION 4-205 DESIGN STANDARDS FOR BRIDGES

Bridges shall conform to AASHTO Standard Specifications for Highway Bridges, latest edition. The design loading requirements shall conform to AASHTO HS20-44 specifications. Plans and a design report shall be prepared by a qualified structural engineer and shall be submitted for review and approval prior to construction. Clear deck width, at a minimum, must accommodate the full width of the travel lanes of approach roads.

Design of bridges on all public roads that have a span of twenty (20) feet or more shall be submitted to WYDOT for review and approval per the requirements of WS § 24-2-106 prior to construction.

The waterway area shall accommodate a one hundred (100) year design flood frequency. A minimum of one and one-half (1-1/2) foot of freeboard is required for the 100 year event. Additional freeboard will be required when drift, debris-laden flows, or ice are anticipated.

DIVISION 4-300 MAILBOX TURNOUTS

All new mailbox installations shall require the approval of the U.S. Postal Service (USPS) as to mailbox design, and the USPS and the Planning and Zoning Commission as to turnout location.

Existing mailboxes may have turnouts constructed as a joint project of the box holder, Johnson County and the USPS.

1. Box holders may remove and replace their existing mailboxes and stands at their own expense, provided the design of their structure is not deemed a safety hazard and complies with these Standards and is approved by the USPS and the Department. However, should scheduling prevent mailbox removal by its owner, Johnson County Road and Bridge crews will remove it at no charge to the box holder. The responsible party will be liable for replacement of the box in accordance with these Standards.

2. The USPS shall be contacted for the availability of mail delivery and approval of turnout design.
SECTION 4-305 STANDARDS

A. All mailbox installations shall conform to the requirements shown on Figure 4-3 and 4-4. Any deviations from these Standards must be reviewed and approved by the Planning and Zoning Commission.

B. All mailboxes and turnouts must be designed, constructed, and installed in conformance with all applicable sections of these Standards, including but not limited to requirements to obtain a ROW Permit.

C. Multiple mailbox units, as provided by the USPS, are allowed. The number of post supports shall determine minimum length requirements, i.e. units with two posts shall have a minimum length of 25' as shown in Figure 4-4.

D. DEVELOPERS SHALL MEET WITH THE LOCAL U.S. POST OFFICE POSTMASTER TO DETERMINE AND UTILIZE REQUIREMENTS FOR MAILBOX TURNOUTS AND MAILBOXES THAT WILL BE SUPPORTED FOR MAIL DELIVERY BY THE U.S. POSTAL SERVICE.

* ADD 5' FOR EACH MAILBOX POST

MAILBOX TURNOUT DETAIL
NOT TO SCALE

FIGURE 4-3
DOUBLE INSTALLATION  SINGLE INSTALLATION  MULTIPLE INSTALLATION

SECTION A - A

NOTES:
1. DIMENSIONS MAY REQUIRE ADJUSTMENT DEPENDING UPON MAILBOX SIZE USED. DIMENSIONS SHOWN ARE FOR AN 11 1/2" MAILBOX.
2. ONLY TWO MAILBOXES PERMITTED EACH POST, UNLESS USPS APPROVED MULTIPLE UNITS.

MAILBOX DETAIL
NOT TO SCALE

FIGURE 4-4
DIVISION 4-400 SCHOOL BUS TURNOUTS

When subdivisions are required to construct a school bus turnout by the Planning and Zoning Commission, the design shall be as shown in Figure 4-5. The location of the turnout shall be determined by the Planning and Zoning Commission.

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ROADWAY

40' MINIMUM

30'

6'

EDGE OF TRAVELWAY

EDGE OF SHOULDER

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SCHOOL BUS TURNOUT DETAIL

NOT TO SCALE

FIGURE 4-5
DIVISION 4-500 DEAD-END ROADS

All dead-end subdivision roads shall be provided with width and turnaround provisions in accordance with Figure 4-6.

![Diagram of turnaround options](image)

**96' DIAMETER CUL-DE-SAC**

**60' "Y"**

**MINIMUM CLEARANCE AROUND A FIRE HYDRANT**

**120' HAMMERHEAD**

**ACCEPTABLE ALTERNATIVE TO 120' HAMMERHEAD**

DEAD-END SUBDIVISION ROAD TURNAROUND DETAIL (Not to scale)  

FIGURE 4-6

Streets terminated by any of the above turnaround facilities shall be constructed in accordance with these Johnson County Subdivision Road Standards. All turnaround facilities shall have the same surfacing requirements as the subdivision street.

The width of all sections/components of the above "Y" Turnaround, the 120' Hammerhead Turnaround and the Acceptable Alternative to the 120' Turnaround shall be the same width as the subdivision street leading into the turnaround.

Due to safety and emergency vehicle access reasons, dead-end streets shall not be constructed to excessive lengths. The Johnson County Planning and Zoning Commission may require design changes when dead-end streets of excessive lengths are proposed.
SECTION 4-505 FIRE APPARATUS ACCESS ROAD GATES

Gates securing the fire apparatus access roads shall comply with all of the following criteria:

1. The minimum gate width shall be 20 feet.
2. Gates shall be of the swinging or sliding type.
3. Construction of gates shall be of materials that allow manual operation by one person.
4. Gate components shall be maintained in an operable condition at all times and replaced or repaired when defective.
5. Electric gates shall be equipped with a means of opening the gate by fire department personnel for emergency access. Emergency opening devices shall be approved by the Johnson County Fire District.
6. Manual opening gates shall not be locked with a padlock or chain and padlock unless they are capable of being opened by means of forcible entry tools or when a key box containing the key(s) to the lock is installed at the gate location.
7. Locking device specifications shall be submitted for approval by the Johnson County Fire District.

DIVISION 4-600 SURFACING REQUIREMENTS

Road surfacing as required by these Standards shall be either hot mix pavement or gravel, as herein specified. Other surfacing types may be acceptable upon review.

SECTION 4-605 HOT PLANT MIX PAVEMENT

Hot plant mix pavement, where required, shall be in accordance with Wyoming Public Works Standard Specifications.

SECTION 4-610 GRAVEL SURFACING

Gravel surfacing, where required, shall be in accordance with Wyoming Public Works Standard Specifications.

DIVISION 4-700 PRE-APPLICATION DEVELOPMENT REVIEW

Johnson County will require a complete set of road construction plans and documents to be submitted with the preliminary plat. The plans need to include at a minimum the following:

1. Title sheet with site location map
2. Grading plan, if applicable
3. Road Plan and Profile, typical section(s) and applicable details, including signage and striping plans
4. Irrigation and drainage plans
5. Details and plans for any proposed improvements
6. Traffic Control Plan in conformance with the MUTCD for construction on any public road
All subdivision developers are required to comply with the Johnson County Subdivision Regulations and these Standards. In addition, a ROW Permit from the Johnson County Road and Bridge Department shall be required for all work within designated County right-of-ways.

DIVISION 4-800 VARIANCES FROM DESIGN AND CONSTRUCTION STANDARDS

Whenever there are practical difficulties involved in carrying out the provisions of this ARTICLE 4, the BOCC, under the following circumstances, may grant a variance from the design criteria and construction specifications contained in these Standards:

1. If, by reason of exceptional topographic or physical conditions or other extraordinary and exceptional situation, or condition, the application of these Standards would result in peculiar and exceptional practical difficulties to, or exceptional and undue hardship upon, an individual proposing to construct a road or bridge.

2. A variance from these Standards may be granted provided relief will not result in substantial detriment to public health, safety and welfare, or substantial impairment of the Standards. Prior to taking action, the BOCC shall review the request for variance and, if necessary, refer any request for variance to the appropriate fire district, the Sheriff’s Department and other interested agencies for comment. The BOCC shall make a determination on whether or not a variance request should be granted.

In reviewing such requests, the BOCC will, at a minimum, consider the following:

A. The effect of using a lesser standard on public health and safety, including the ability of emergency vehicles to gain access using roads built to a lesser standard;
B. The severity of the terrain crossed by the road alignment;
C. The availability of alternative alignments where the same or more stringent road standards could be met with the same or less environmental damage;
D. The length of road segments which will be built to a lesser standard; and
E. The amount of snowfall anticipated and degree of exposure of the road surface to the sun.

Costs may be included in the review of a variance request, but will not be a primary factor for considering a request. If costs are considered, the BOCC shall consider the initial and long term costs. The applicant shall provide all cost data requested by the BOCC.

DIVISION 4-900 ENFORCEMENT OF DESIGN AND CONSTRUCTION STANDARDS

Following construction of any subdivision road, a certification shall be given by the Responsible Party’s Engineer that construction has been completed in conformance with these Standards. The construction certification shall be by a registered Engineer in the state of Wyoming qualified in road design.
APPENDIX A – DEFINITIONS

1. **ADT** – Average Daily Traffic

2. **Department** – Johnson County Road and Bridge Department.

3. **Emergency** – Unforeseen situation occurring that presents imminent threat to person or property.

4. **Functional classification** – The classification of highways into different operational systems, functional classes, or geometric design types. Functional classification, the grouping of highways by character of service they provide.

5. **Horizontal alignment** – The fixing of points on the ground in the correct lines for setting out a road centerline. A ground plan showing a route, the centerline of the road.

6. **Hot plant mix pavement** – A surfacing material that consists of plant mixed aggregate, mineral filler or chemical additive, and bituminous material, constructed on a prepared foundation.

7. **Planning and Zoning Commission** – Johnson County Planning and Zoning Commission

8. **Responsible Party** – Any individual, corporation, partnership or other legal entity involved in developing improvements covered by these Standards. Includes subcontractors, contractors, utilities, developers and owners as applicable.

9. **Shoulder** – The graded width of shoulder is measured from the edge of the traveled way to the intersection of the shoulder slope or surfacing taper. The shoulder on minor rural roads with low traffic volumes serves as lateral support for the surfacing and as additional width for the traveled way. The shoulder shall have the same surfacing material and thickness as the traveled way.

10. **Superelevation** – A tilt given to a road at a curve to counteract the effect of centrifugal force. The outside of the curve is higher than the inside.

11. **Superelevation Transition** – The progression of the roadway from the normal crown section to a fully superelevated section.

12. **Surfacing Taper or Shoulder Slope** – The slope beginning at the outer edge of the shoulder and extending outward at a taper of 1V:6H or flatter slope.


14. **Vertical alignment** – A section vertically through the center line of a road to show the original and/or final ground (design) levels.
APPENDIX B – SPECIFICATION BY REFERENCE

All applicable specifications of agencies or organizations listed are made a portion of these Standards by reference and shall be the latest edition or revision thereof.

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>AASHTO Green Book</td>
<td>A Policy on Geometric Design of Highways and Streets</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
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<tr>
<td>BOCC</td>
<td>Board of County Commissioners</td>
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<td>CRFM</td>
<td>County Road Fund Manual, March 2000</td>
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<td>Trip Generation Manual, Institute of Transportation Engineers</td>
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<td>Manual on Uniform Traffic Control Devices</td>
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