APPENDIX G – DESIGN AND CONSTRUCTION STANDARDS FOR PRIVATE LOCAL ACCESS ROADS

G.1 GENERAL

G.1.1 Purpose

The purpose of the following design standards is to safeguard life, limb, property and the public welfare by regulating construction of private local access roads serving either multiple residences or businesses that serve the general public. They also provide design recommendations for private roads accessing single residences. The regulations are intended to:

- Establish reasonable minimum standards for emergency access and roadway safety
- Encourage that private local access roads and driveways meet these standards while minimizing the amount of site disruption caused by such construction.

These minimum design standards for safe, maintainable roadways should balance the desire to preserve the natural terrain and landscapes of rural areas in the County while maintaining fairness and respect for individual rights. These standards are not intended to inhibit creative design, provided that safety is maintained and site disturbance is minimized, nor are they intended to prevent development of private property in Larimer County. The intent is to encourage roadways which "fit" with the natural terrain while providing safe, functional roads. Maximum creativity in design is encouraged when designing rural access roads.

G.1.2 Administration

1. **General.** Permitting for, and enforcement of, this regulation shall be administered through the Larimer County Engineering Department by the County Engineer or his designated representative. The final design of the road is intended to be a cooperative effort between the landowner, the Engineer and other consulting parties as needed. Administration of this regulation shall be driven by the objective of attaining site-specific road design and construction that will meet the minimum requirements for reasonable emergency access, roadway safety, protection of soil and water natural resources and that respects the landowner's individual rights.
2. **Administrative Appeal.** In order to assure a flexible, site specific design process, deviations from the standards may be granted for some requirements at the discretion of the Engineer. Deviations from the design standards must be considered on a site by site basis and must assure that the final design of the road will not unduly compromise the minimum requirements for emergency access and roadway safety. Such deviations must be granted in writing by the Engineer.
3. **Enforcement.** After August 23, 1999, construction of a private local access road which accesses more than one residential property (Multiple Access Road), without proper permitting and certification is a violation of this regulation. If the road is not in compliance, proper permitting and reconstruction of the road to

meet the standards as described in this regulation must be completed before its use as a Multiple Access Road. The County may enforce this regulation by any legal or equitable means recognized by the Colorado Revised Statutes, Colorado Court Rules, and/or common law. Remedies may include, but are not limited to, denial, withholding or revocation of permits, certificates or other forms of authorization to use or develop any land, structure or improvements; and initiation of court actions for injunctions, abatement, mandamus, or damages. No Larimer County Access Permit, to access a public County road, shall be granted for a private multiple access road unless it is shown to be constructed to meet the minimum requirements of this regulation.

G.2 PRIVATE ROAD CONSTRUCTION PERMIT REQUIREMENTS

G.2.1 Multiple Access Roads

A Private Road Construction Permit is required prior to new construction of private local access roads that are:

- intended to access multiple residences or
- private roads accessing businesses that are used by the general public in Larimer County.

Private Road Construction Permit applications will be reviewed by the Engineer or designated representative of the Larimer County Engineering Department. A site inspection may be required if sufficient information is not included with the application. In such cases a Pre-Application Inspection Report will be generated by the County Engineer. Issuance of permits requires satisfactory compliance with the Larimer County Design Standards for Private Local Access Roads.

G.2.2 Exception for Roads Built Before August 23, 1999

Multiple access roads built before August 23, 1999 are exempt from these standards. The road must have been used as multiple access historically prior to this date for the exemption to apply. Otherwise it is considered a change of use and must meet these minimum standards. The Engineer will, at the owner's request, certify reconstruction of the road to conform to these County standards. In such cases the requirements of this document will apply, including associated fees.

G.2.3 Certification of Single Access Roads

A permit is not required to construct the road to a single residence. The Engineer will, however, at the owner's request, certify the new construction, or reconstruction, of these roads as being built to Larimer County recommended standards. This may be done by applying for a Private Road Construction Permit and following the procedures set forth in this document for local access road construction. Any applicable inspection fees will apply.

G.2.4 Requirements for Application

Application for a private road construction permit must be accompanied by a plan of sufficient clarity to indicate the nature and extent of the work. The plan must show sufficient topography to estimate the general longitudinal profile of the proposed road, extent of cuts and fills, and location of drainages, wetlands, and water features. The

plan must give the location of the work, the name of the owner, the name of the person who prepared the plan, and the contractor proposed to accomplish the work, if applicable. The plan must include the following specific information:

1. A copy of the Pre-application Inspection Report from the Larimer County Engineering Department, if applicable.
2. Horizontal alignment of the proposed road shown on a topographic map of sufficient scale to allow cut and fill volumes and longitudinal profile to be estimated.
3. Locations, dimensions, and designed flow capacity of proposed drainage structures such as culverts.
4. Typical cross-sections of the road design showing width, drainage feature dimensions, depth of road surfacing materials, and proposed sub-grade treatment. A cross section must be shown for each major change in design parameters.
5. Location of any buildings, structures, natural drainages, wetlands, and water features within 100 feet of the grading work or that may be affected by the proposed grading work.
6. An erosion control plan specific to the site conditions delineating temporary and permanent mitigation measures to minimize erosion and sediment transport. See Larimer County Stormwater Design Standards, June 20, 2005, Addendum to Volume 3 of the USDCM, for examples of accepted Best Management Practices for such mitigation measures.

G.3 ENGINEERED DESIGN

In some cases, where the safety or functionality of the road is compromised by complicated or unstable geology, large stream crossings, or other complicated drainage issues, an engineered design may be required by the Engineer. In these cases the application must be accompanied by appropriate drainage reports, soils engineering reports and/or engineering geology reports as required by the Engineer. The plans and specifications must be prepared and signed by an individual licensed by the State of Colorado to prepare such plans or specifications. The engineer preparing the plans must inspect as necessary and certify that the grading was done in accordance with the final approved plan.

G.4 RESOLUTION OF CONFLICTS

In cases where irreconcilable differences arise between the Engineer and the applicant, the applicant may request a variance as described in Chapter 1 of the Larimer County Rural Area Road Standards.

G.5 NOTICE OF COMPLETION

The applicant must notify the Engineer or the designated official when the road is ready for final inspection. Final approval will not be given until all work, including installation of all drainage facilities and their protective devices, and all erosion control measures, has been completed in accordance with the final approved plan, and any required certifications are submitted.

G.6 FEES

Application fees for plan review and field inspection(s) must be paid before the Road Construction Permit is granted. Payment of final inspection fees shall be paid before final acceptance/certification is granted.

G.7 ROAD DESIGN STANDARDS

Private local roads accessing multiple residential parcels (multiple access roads) or serving businesses that will involve travel by the general public must be constructed to the following standards. Although the standards are considered to be minimums to provide a safe, functional road, they represent the idealized situation where few physical constraints exist. A typical cross section is represented in Figure 1. Many areas in rural Larimer County possess unique physical attributes which make it necessary to construct the road to fit the individual site circumstances. Deviations from the minimum standards herein, to address such problems, must be shown on the construction plans at time of permit application. Field changes must be approved in writing by the Engineer or his designated representative. They must also be shown on as-built drawings at the time of final inspection.

For roads accessing single family residences, the standards herein can be used as design guidelines. While construction of such roads to the Larimer County standards is optional, it is highly recommended and will benefit the landowner. Individuals wishing to certify construction of these roads to County standards may apply for a Private Road Construction Permit and comply with the following road design standards. All fees will apply. Reconstruction of pre-existing roads to comply with the standards may be certified in the same manner.

G.7.1 Road Width

G.7.1.1 Roads accessing multiple lots (Multiple access roads)

A driveable all-weather road surface width of 20 feet is required for an adequate two-way roadway to assure safe ingress and egress of emergency response vehicles. A narrower width for short distances, to minimize cut volumes or address other environmental concerns, may be acceptable if adequate turnouts are incorporated into the design and the road design is demonstrated to be otherwise safe and maintainable. The minimum acceptable width in these cases is 12 feet and must incorporate appropriate turnouts as described in Section G.7.6.

G.7.1.2 Roads accessing single lots

A driveable all weather road surface width of 12 feet is recommended to assure safe ingress and egress of emergency response vehicles. To minimize cut volumes, or if topography makes this width impractical, a narrower width, for short distances, may be acceptable if the road design is demonstrated to be otherwise safe and maintainable. The minimum acceptable width in these cases is 10 feet.

G.7.1.3 Clearance height

Access roads through forested areas must maintain proper clearance heights above the traveled way sufficient to allow passage of emergency vehicles. Tree branches must be trimmed to obtain a minimum overhead clearance of 13 feet 6 inches.

G.7.2 Road Grade

Road design must incorporate a maximum longitudinal slope of 8% (10% in mountainous terrain). Road designs exceeding these longitudinal slopes must ensure that other safety and site disturbance guidelines are not compromised. Where topography requires, steeper grades may be necessary. The Engineer may grant deviations in writing for unusual cases in mountainous or hilly terrain. However, the average grade for 200 feet should not exceed 12%.

G.7.3 Horizontal Road Curve

Radii of curvature on centerlines may be a minimum of 100 feet (60 feet in steep terrain), so long as adequate sight distance exists to allow a safe stopping distance. Mountainous terrain may require a deviation from this standard if topography is steep. The Engineer must approve such variance.

G.7.4 Vertical Road Curve

For safety reasons, design of crest vertical curves (top of hill crests) must be based on the design speed of the road. The design speed must take into account sight distance limitations which result from extreme crest vertical curves. Correspondingly, sag vertical curves (bottom of hill) must also be designed based on the design speed, such that headlight visibility will not be compromised in nighttime or dim light conditions. Recommended design speed for most local access roads is 15 mph in steep, mountainous areas and 25 mph in rolling to flat areas.

G.7.5 Road Intersections

Intersections should be within ten degrees of perpendicular for at least 50 feet from intersection centerlines with adequate sight distance both directions. If topography allows, grades should flatten to 3% or less for at least 50 feet approaching intersections.

G.7.6 Dead End Roads

Dead end multiple access roads must be constructed with a vehicular turnaround area at the end or within the last 600 feet of roadway. Single access roads exceeding 600 feet in length should incorporate this standard as well. Turnarounds may take a number of forms (Figure 2), including a traditional cul-de-sac bubble, a hammerhead or “T” shape, or a turning loop. Cul-de-sac bubbles and turning loops must have a minimum radius of 40 feet. T’s must have a minimum length of 35 feet on both sides. For roads narrower than 20 feet, turnouts must be provided at approximately every 600 feet of road. Greater distances may be allowable if good sight distance is maintained between adjacent turnouts. The turnouts must be constructed to allow turning movements to be made by emergency vehicles (Figure 2). Turnouts must be an all weather road surface at least 8 feet wide and 30 feet long.

Note: Though not a requirement in the design for 20 ft wide roads, turnouts should be considered if the road is the single access and egress point to the parcels served.

G.7.7 Cuts and Fills

Roadways should follow existing contours to the extent possible. Roadway cuts and embankments should be considered only to the extent they are necessary to maintain

safe geometric conditions for the design speed. Construction of cuts and fills in these cases must be constructed to the following requirements to maximize the safety and integrity of such work.

G.7.7.1 Cuts

a. **General.** Unless otherwise recommended in an approved soils engineering or engineering geology report, cuts must conform to the provisions of this section.

b. **Slope.** The slope of cut surfaces must be no steeper than is safe for the intended use and must be no steeper than 1 unit vertical in 1.5 units horizontal (66.7% slope) in common soil. Cut slopes in competent rock may be vertical when less than 3 feet high. Cut slopes in competent rock greater than 3 feet high and less than 8 feet high must be no greater than 1 unit vertical to 3 unit horizontal. Cut slopes greater than 8 feet high, or where unstable or compromising geology occurs, may require a soils engineering or an engineering geology report, or both, stating that the site has been investigated. Such reports must provide a recommended slope configuration to stabilize the constructed cut. When required by the Engineer, the report must be prepared and signed by an individual licensed by the state to prepare such plans and specifications. Construction of such cut slopes must conform to the recommendations of the report.

   Cut slopes must be seeded to reestablish appropriate vegetative cover to maximize slope stability and minimize erosion. Existing topsoil on the site must be saved and stockpiled for dressing the slope prior to seeding. Mulching of the soil surface after seeding is required to minimize erosion and protect seeds while germination and plant establishment take place. These requirements may be subject to appeal when slope material not conducive to plant growth and establishment make it inappropriate. In these cases it may be necessary to use other physical or mechanical means to stabilize the slope material. Best Management Practices (BMP) and information about seeding and revegetation are available in the Larimer County Storm Water Design Standards. Copies are available at the Larimer County Engineering Department.

G.7.7.2 Fills

a. **General.** Unless otherwise recommended in an approved soils engineering report, fills must conform to the provisions of this section.

b. **Preparation of Ground.** Fill slopes must not be constructed on natural slopes steeper than 1 unit vertical in 2 units horizontal (50% slope). The ground surface must be prepared to receive fill by removing woody vegetation such as shrubs, topsoil and other unsuitable materials and scarifying to provide a bond with the new fill. Where slopes are steeper than 1 unit vertical in 5 units horizontal (20% slope) and the height is greater than 5 feet, stability must be achieved by benching at the toe into sound bedrock or other competent material.

c. **Fill Material.** Composition of fill material must follow these requirements:

   i. Detrimental amounts of organic material will not be permitted in fills.

ii. Rock sizes greater than 12 inches in maximum dimension

iii. must be placed 2 feet or more below grade, measured vertically.

iv. Rocks must be placed so as to assure filling of all voids with well-graded soil.

v. The upper 2 feet of fill must be compacted for stability in preparation for placement of surfacing material.

d. **Slope.** Fill slopes must be no steeper than 1 unit vertical in 2 units horizontal (50% slope) unless the fill is engineered and constructed in such a way as to establish stability at a steeper slope. Design of such fills must be done by an individual licensed by the state to do such work. Fill slopes must be seeded to reestablish appropriate vegetative cover to maximize slope stability and minimize erosion. Whenever possible, existing topsoil on the site must be saved and stockpiled for dressing the slope prior to seeding.

G.7.7.3 Slope Setbacks

These setback recommendations are included for general consideration to avoid conflicts and potential problems with other landowners. They should be followed when planning a road or other excavations.

a. **General.** Cut and fill slopes should be set back from site boundaries in accordance with this section. Setback dimensions are horizontal distances measured perpendicular to the site boundary. Setback dimensions should be as shown in Figure 3.

b. **Top of Cut Slope.** The top of cut slopes should not be made nearer to a site boundary line than one fifth of the vertical height of cut with a minimum of 2 feet and a maximum of 10 feet.

c. **Toe of Fill Slope.** The toe of fill slope should be made not nearer to the site boundary line than one half the height of the slope with a minimum of 2 feet and a maximum of 20 feet. Where a fill slope is to be located near the site boundary and the adjacent off-site property is developed, special precautions should be incorporated in the work, as necessary, to protect the adjoining property from damage as a result of such grading. These precautions may include but are not limited to:

1) Additional setbacks.

2) Provision for retaining or slough walls.

3) Mechanical or chemical treatment of the fill slope surface to minimize erosion.

4) Provisions for the control of surface waters.

G.7.8 Drainage

Plans for adequate site and roadway drainage are required for all road construction. Road design must contain provisions for stormwater drainage sufficient to achieve a standard of no ponding at all locations. Adequate design must insure the natural drainage system will be maintained and erosion is minimized.

1. **Single Access Roads.** Single-residence driveways should provide cross culverts or structures crossing natural drainages as needed to maintain natural drainage patterns and conduct stormwater away from the roadway. These culverts should, at a minimum, be sized to pass the flow generated by a 10-year storm. They should be at least 12 inches in diameter and have a minimum cross-sectional area of at least 0.78 square feet. When voluntary certification is desired, all such structures must appear on the road grading plan and be accepted by the Engineer before a permit can be issued.
2. **Multiple Access Roads.** Road systems accessing multiple residences (e.g. rural subdivisions) must provide cross culverts, as needed, to maintain natural drainage patterns and distribute stormwater away from the roadway. Such structures must be sized to pass at least the flow generated by a 10-year storm. Culverts may not be smaller than 18 inches in diameter nor have cross-sectional area of less than 1.77 square feet. The Engineer may require more stringent design criteria as necessary for safety and protection of property and natural drainage patterns. Adequate sizing of such structures will be determined at the planning and design stage for such road systems and must be accepted by the Engineer before a road construction grading permit is issued.
3. **Culvert Specification.** Culverts must be either double-wall corrugated plastic or single wall corrugated metal pipe. Single-wall pipe may be acceptable if it can be demonstrated that it meets the minimum requirements of this section. A minimum of 12 inches of cover of material compacted to manufacturer's specifications is recommended unless manufacturers specifications indicate a lesser amount is sufficient to achieve the required bearing capacity. The culvert must be of sufficient strength and proper installation to assure a minimum of 10 tons bearing capacity.
4. **Bridge Specification.** Bridges must be constructed to comply with the general specifications of Chapter 7 of the Larimer County Rural Area Road Standards.

G.7.9 Erosion Control and Site Reclamation

Erosion control and site reclamation improvements are required as part of every permitted road construction and excavation project. A plan to control stormwater along the roadway to lessen the degree of concentration of stormwaters must be incorporated in the erosion control plan. The plan must incorporate erosion control and site restoration measures to 1) assure effective stabilization of soil materials so that displacement and transport of soil materials is minimized and 2) affect restoration of natural vegetative ground cover to disturbed areas. In many cases the most effective means of controlling erosion is reestablishment of vegetation on disturbed areas. It is recommended that natural vegetation be left intact to the greatest extent possible.

Recommendations for erosion control techniques and revegetation practices are outlined in Larimer County Stormwater Design Standards, June 20, 2005, Addendum to Volume 3 of the USDCM. If road construction will disturb one acre or greater, a Stormwater Construction Permit is required from the Colorado Department of Public Health and Environment.

G.7.10 Buffer Zones for Streams, Intermittent Streams and Wetlands

For roads which follow perennial stream corridors, a minimum 50-foot buffer zone of undisturbed vegetation must be maintained between the roadway or from any fill

material generated by the construction of the road and the normal high-water line of the stream. Proper revegetation of cut and fill slopes or other means of erosion and stormwater control must be affected to protect water quality of the stream. The Engineer may grant deviations from this buffer requirement if it can be demonstrated that the effects of such construction will not degrade water quality.

Construction of roadways within intermittent streams or drainageways shall not be permitted except for purposes of crossings. Proper design to allow adequate flow of stormwater, as indicated by the normal high-water line, must be incorporated in the plan. A buffer of at least 20 feet of undisturbed ground and vegetative cover from the normal high-water line must be maintained for roadways paralleling these features.

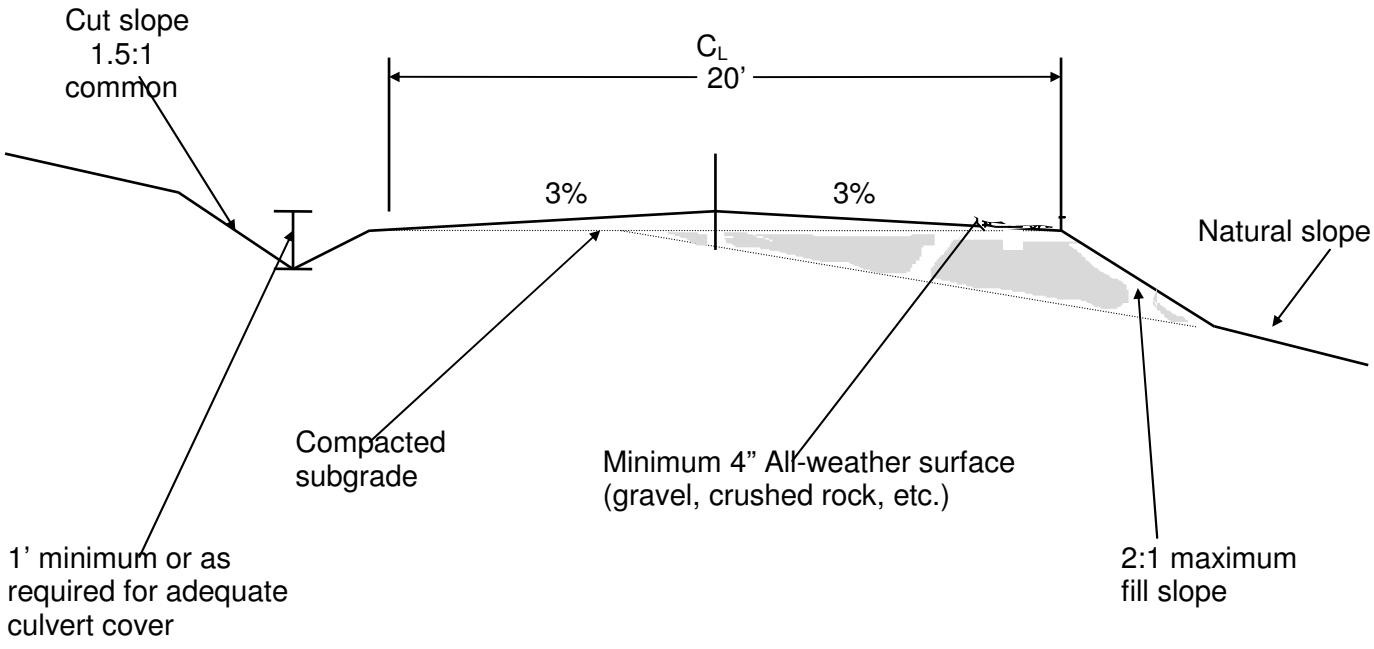
A 50- foot buffer zone must be maintained for wetlands unless further encroachment has been approved by the U.S. Army Corps of Engineers. Delineation of the wetland may be required by a qualified person to properly identify the extent of the wetland boundaries.

G.7.11 General Considerations

Planning and construction of these roads should take into consideration all aspects of the effects of such construction activities. Among these should be consideration of encroachment upon critical wildlife habitat, wetlands conservation, protection of water quality in local streams, ponds and lakes, esthetics, etc. Site specific variances from the above standards to mitigate such concerns shall be considered so long as roadway safety and emergency access are maintained. Applicants are encouraged to study these issues and seek help from appropriate agencies or individuals to assess all effects of the proposed construction as a part of the planning process.

G.7.12 Other Permits and Conditions

Issuance of a Private Road Construction Permit does not exempt the applicant from acquiring other permits regarding other local, State or Federal requirements.



NOTE: Total road width may be reduced to 12’ (10’ in unusual cases) with constant 4% cross slope for single access roads. Turnouts at maximum intervals of 600’ should be at least 30’ long.

Figure 1 - Private Local Access Road Typical Cross Section

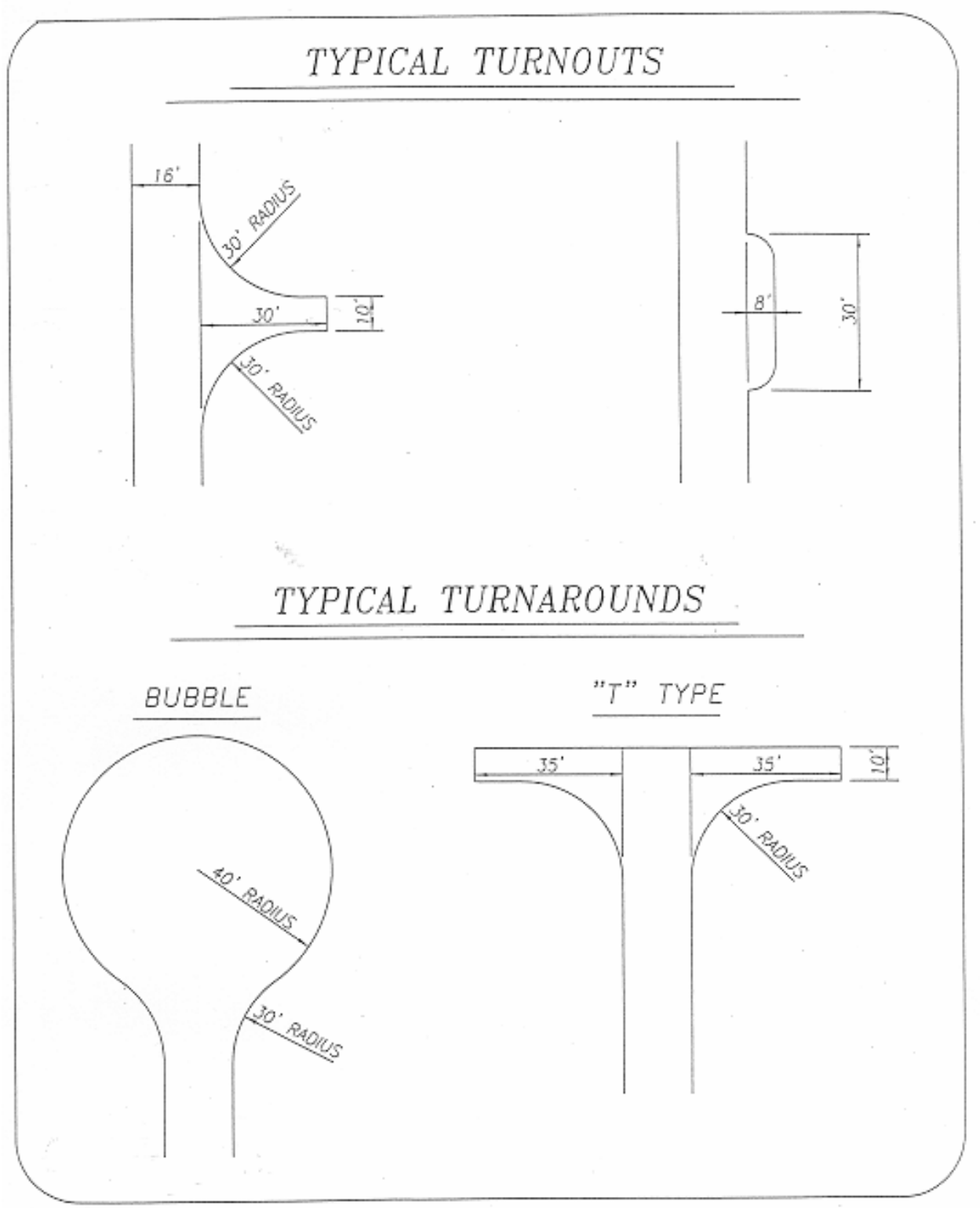


Figure 2. Minimum Geometric Requirements for Turnouts and Turnarounds

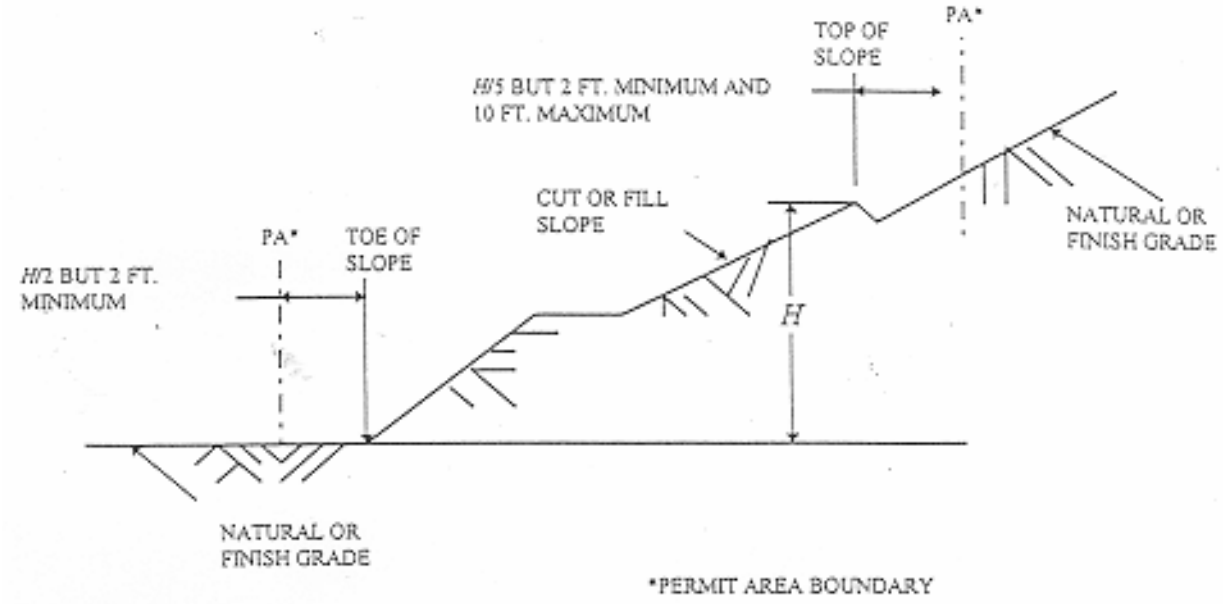


Figure 3. Slope Setback Requirements

EXHIBIT 1

Date August 23, 1999

PUBLIC WORKS DIVISION APPEALS PROCESS
ROAD CERTIFICATION - PRIVATE LOCAL ACCESS ROADS

In the event that an applicant does not agree with a decision made pursuant to this regulation by an employee within the Engineering Department, the applicant may, by written request submitted to the Public Works Division not later than 30 days after the date the decision was made, appeal the decision to the County Engineer. The County Engineer will meet with the applicant and either affirm, reverse or modify the lower decision. If the County Engineer's decision is unsatisfactory to the applicant, the applicant may, by written request submitted to the Public Works Division not later than 30 days after the date the decision, appeal the decision to the Director of Public Works, who will meet with the applicant and either affirm, reverse or modify the lower decision.

In the event that the Director of Public Work's decision is unsatisfactory to the applicant, the applicant may, by written request, appeal the matter to the County Commissioners. The County Commissioners will hold a public hearing on the matter upon 15 days written notice to the applicant (which notice may be waived by the applicant) and render a written decision within a reasonable time thereafter.

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Director of Public Works