USDA

RURAL DEVELOPMENT
Rural Housing Service
Rural Business – Cooperative Service
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Dedicated to Strengthening and Serving Rural America

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SUBJECT: **ARCHITECTURAL TECHNICAL GUIDE 0013 (December 19, 2002)**
Special Site Grading Design Criteria for Surface Storm Water Drainage and to Accommodate Persons with Disabilities: Requirements for Single Family Housing New and Existing Construction

PURPOSE:

The general purpose of this technical guide is to continue an ongoing statewide policy for reviewing and verifying site surface grading designs and construction for compliance with Rural Development's Single Family Housing (SFH) Program residential "Development Standard". Past experience has shown that deficiencies in the initial design as well as the actual accomplishment of final grading around single family residences have resulted in many instances of undesirable repair costs to borrowers and to the United States government. This document is intended to provide specific guidance to: (1) assist in protecting lower building siding and trim materials from the effects of surface drainage; (2) aid in protecting building foundation systems from the effects of surface drainage; (3) assist in optimizing surface drainage across entire properties; (4) preserve historical storm water surface drainage scenarios; and (5) optimize wheelchair accessibility to residences, when pertinent. The guide in not intended to address subsurface drainage concerns, a related but separate design and construction matter.

IMPLEMENTATION RESPONSIBILITIES:

Site grading, affecting new and existing construction, should be closely evaluated in accordance with the following procedures, as pertinent for new or existing construction:

New Construction:

Rural Development loan managers should request and review three identical sets (one for the applicant, contractor, and Rural Development) of construction site development plans for proposed residences, prepared in accordance with Rural Development Instruction 1924-A, Exhibit C (Paragraph II.A. and Attachments 1 and 2).

The documents should be initially screened by Rural Development loan managers for completeness. Incomplete documents should be returned with an explanation and direction for reaccomplishment/resubmittal. Rural Development loan managers should then review the proposed grading design for conformance to the guidance set forth in:

(1) The current model building code being enforced by Rural Development within Colorado;
(2) Rural Development Instruction 1924-A, Guide 2;
(3) Rural Development Instruction 1924-C, Exhibit B, Table 3; and
(4) The "*Uniform Federal Accessibility Standards"* (pertinent and entirely optional in cases where wheelchair accessibility is an additional consideration).

The combination of these site development criteria appears to have historically proven effective in adequately protecting most residential structures within our State. The main thrust of these requirements is summarized in Exhibit A to this Architectural Technical Guide, for user convenience.

The primary components of residential property surface storm water drainage control include:

(1) Roof drainage components (gutters, scuppers, diverters, downspouts, splashblocks, and downspout extensions;
(2) Exposed foundation wall (exposed surface of the foundation wall between finish grade and the bottom of siding and trim materials);
(3) Foundation wall backfill area protective slope (the ground surface typically up to about ten feet horizontally from the building's foundation wall); and
(4) Outer lot grading (the ground surface of the remainder of the residential property).

Some of the primary intentions all proposed (and executed) site grading designs should be to:

(1) Properly direct concentrated roof storm water drainage to (a) protect buildings and pavements from damage due to soil heaving and settlement and (b) protect foundation backfill areas and outer lot grading from unacceptable erosion and long duration ponding;
(2) Properly direct all other storm water surface drainage on the property for similar reasons; and
(3) Protect neighboring properties from surface drainage damage by properly integrating the site's drainage design with historical and locally planned drainage schemes.
(4) Accommodate the special needs of persons confined to wheelchairs, in those cases where that situation applies.

Rural Development loan managers, when reviewing site planning exhibits, should specifically verify (among other essential features) that the proposed top-of-foundation wall and top-of-finish floor elevations are properly represented on the proposed plot plan (since these would to be verified later, as discussed below).

Rural Development loan managers are encouraged to visit subject properties at an early stage to verify that the proposed site grading designs would be consistent with real world considerations and that there would be no irreconcilable hindrances. If designs appear unrealistic at this stage, the contractor should be requested to make necessary modifications to conform to Rural Development's site development standards, as set forth above and in Exhibit A to this Architectural Technical Guide. If proposed sites appear incapable of being developed to meet Rural Development's standards, they should be rejected. If site grading and drainage designs appear that they could realistically be accomplished, Rural Development loan managers may determine them acceptable for lending purposes.

When site designs reach the point where they could be concurred by Rural Development, they should be incorporated into minimum three sets of "official" (signed by all parties; one set for the owner, one set for the contractor, and one set for Rural Development) construction drawings and specifications. All subsequent site development construction work should conform to these documents.

It is imperative that the actually constructed site grading correspond to the original design.

During the course of construction Rural Development loan managers should perform reasonable site construction oversight (as time constraints allow) to insure that the site work in place does not deviate significantly from the intent of the "official" construction drawings and specifications. Any noted deviations should be immediately brought to the attention of the applicant and the contractor, for resolution, and should be documented on Rural Development Form 1924-12, *"Inspection Report"*. It is recommended that the top-of-foundation elevation be scrutinized and questioned during the Stage 1 Inspection prior to its actual installation. Would it be high enough to achieve the desired "primary intentions" of site grading as discussed earlier. Again, any suspected problems should be expeditiously brought to the attention of the applicant and the contractor and should be documented in writing.

Prior to the issuance of final payment to the contractor, the contractor should supply Rural Development a certification, prepared by either a Colorado registered land surveyor or engineer, stating that the actual final grading is similar to that originally designed, within a tolerance of plus or minus 2inches vertically. The certification language provided in Exhibit B to this Architectural Technical Guide is recommended for this purpose. The cost of this certification should be considered an eligible loanmaking purpose and should be itemized in the general contractor's bid.

If the in-place grading is verified as either: (1) conforming substantially with the original design, within a plus or minus 2-inch tolerance, or (2) not conforming exactly with the original design (i.e. design may have been altered for a legitimate reason), but still complying with the Rural Development's overall general grading recommendations, the certification may be accepted and the general contractor may be issued final payment, unless other unrelated circumstances apply. Otherwise, the general contractor should be requested to correct the noncompliances to meet the criteria of the construction documents. The State Architect may be consulted to assist in the resolution of such technical conflicts, should they arise.

Additions to Existing Construction:

Site grading designs and construction pertaining to additions to existing residences should be treated identically to those for new construction except that the requirement for obtaining a surveyor's certification (Exhibit B to this Architectural Technical Guide) may be waived by Rural Development loan managers if it is determined that its usefulness would be negligible for achieving grading in accordance with the Rural Development's site grading criteria. An example where obtaining the certification might be unnecessary would be adding a bedroom to an existing residence on a site with a simple and ample drainage pattern.

Existing Construction:

When existing properties are being considered for Rural Development financial assistance, existing site grading conditions should be evaluated by Rural Development loan managers to determine if they substantially conform to the criteria stated in Exhibit A to this Architectural Technical Guide. If they do, no further work is necessary. If they do not, it should be ascertained whether they could be cost effectively upgraded to substantially conform.

If a property were deemed infeasible to substantially upgrade to Rural Development's grading criteria, it should be determined unsuitable for Rural Development financing.

If, on the other hand, a property were deemed feasible to upgrade to the Rural Development's grading criteria, financial assistance might be provided, to include the cost of upgrading the site

drainage. In this case: (1) a site regrading plan, prepared and accepted in a similar manner to that for new construction, should provided and (2) actual site regrading should be verified by the Rural Development loan manager as substantially conforming with the proposed redevelopment scheme. Please note that a site regrading scheme might actually need to involve more components than merely regrading. It might also entail:

(1) Constructing retaining walls;
(2) Waterproofing foundation walls;
(3) Building earthen berms; I
(4) Installing concrete drainage pans;
(5) Removing trees and shrubs planted too closely to foundation walls;
(6) Releveling concrete slabs;
(7) Repouring concrete stoops;
(8) Caulking slab/foundation wall junctures;
(9) Reconstructing roof drainage components; and
(10) Numerous other considerations necessary to achieve the site grading objectives discussed earlier for new construction.

The State Architect may be consulted with regard to proposed site redevelopment schemes and any other technical issues discussed in this document. Rural Development loan managers are encouraged to realistically explain all the requirements covered by this Architectural Technical Guide to applicants and contractors as early as appropriate since they do imply an added dimension of responsibility and probably additional cost.

Special Design Considerations for Persons with Disabilities

The design guidance contained in the *"Uniform Federal Accessibility Standards"* (UFAS) is primarily recommended for instances where site planning must consider accommodating persons confined to wheelchairs and for other disabilities. It should be noted that this is entirely optional on the homeowner's part, but the UFAS is a good starting point.

A .html version of the UFAS (including associated .gif graphic images) can be downloaded from the following Access Board website:

http://www.access-board.gov/ufas/ufas-html/ufas.htm

It is recommended that homeowners with disabilities be advised of the availability of the UFAS to provide basic design guidance that can be personalized to their individual requirements.

It is also worth noting that constructing special features to accommodate wheelchair users can introduce conflicts with design for surface storm water drainage. This is because special design aspects for easy wheelchair movement could tend to soften slopes near buildings to nearly level conditions. Surface storm drainage could, thus, be dammed between sidewalks, ramps, and buildings necessitating draining under sidewalks via catch basins and pipes, sidewalk grated drains, or other methods. It is recommended that the State Architect be consulted for guidance on this subject when evaluating such designs to assist in achieving proper pipe slopes, etc.

Communications with Homeowners and Contractors

A brief word about verbal and written communications by Rural Development representatives with prospective homeowners and contractors.

In today's growing litigative environment, Rural Development representatives are cautioned to NOT exceed their administrative authority while discharging their duties and potentially assume the responsibility area of either homeowners or contractors, thereby exposing the agency to potential tort claim litigation. Rural Development's role in the above-discussed matters is inherently advisory with the intent to assist homeowners and contractors, while at the same time helping to insure the long-term security value of mortgaged properties. This sometimes has to be achieved via delicate communications. The agency's design and construction criteria (and their related advantages) should be clearly explained, however, their occasional conflicts with other homeowner desires and contractor construction practices should be weighed with flexibility.

A homeowner confined to a wheelchair, for example, might desire to incorporate certain features of the *"Uniform Federal Accessibility Standards"* (UFAS) into a proposed site development design but not desire the precise manner represented in the UFAS. Bottom line, they are permitted this latitude. It would be inappropriate for a Rural Development representative to insist that the precise UFAS design must be constructed; however, it would be appropriate to advise the homeowner that the UFAS design was arrived at as the result of much testing and development and may, in the long run, prove to be more desirable to the homeowner. It would, similarly, be inappropriate for a Rural Development representative to insist that the contractor must utilize a particular construction method to install a wheelchair accessible element into the site development design (under the protest of either the homeowner, contractor, or both); however, it would be appropriate to point out the advantages of doing so. It would, similarly, be inappropriate for a Rural Development representative to call a contractor's work "substandard" though it would be appropriate to point out that it <u>appeared</u> that a less costly construction method was utilized (than was specified in the contract bid specifications) that would accomplish the intended objective but might warrant a monetary credit to the homeowner (via a contractor contract change order request to the homeowner). In this case, the burden of proof would be placed on the contractor to prove otherwise.

Some examples of exceeding-your-authority don'ts would include:

(1) Direct homeowners concerning which products or materials must be utilized.
(2) Direct contractors regarding which construction methods must be employed.
(3) Make representations that could only be backed up by actual field instrument verifications.
(4) Make building code interpretations that were within the purview of the local building department.
(5) Direct contractor or subcontractor operations and usurp their authorities.
(6) Direct design beyond the scope of Rural Development technical guidance documents.
(7) Deny the homeowner or contractor the right to justify their positions on these matters.

Bottom line, it is appropriate to genuinely question design, practicality, and cost matters and bring them to all parties' attention for resolution, so long as it may not be construed to be harassment. Be careful of making automatic assumptions where the unobvious may play a role.

DAVID W. RIGIROZZI
State Architect
USDA/Rural Development

Exhibit A, *"Summary of Single Family Housing Grading Requirements for Effective Drainage"*
Exhibit B, *"Guide Surveyor's Certification"*

Architectural Technical Guide 00013
Exhibit A
SUMMARY OF SINGLE FAMILY HOUSING GRADING REQUIREMENTS FOR EFFECTIVE DRAINAGE

(The following minimum and maximum gradients, summarized from the:
International Conference of Building Officials (ICBO) *"Uniform Building Code"* (UBC) 1991 Edition,
Exhibit B to Rural Development Instruction 1924-C,
Rural Development *"Manual of Acceptable Practices"* (MAP), Handbook 4930.1,
"Uniform Federal Accessibility Standards" (UFAS), and
Standard practice
are suggested for effective site drainage for USDA/Rural Development financed single family housing construction within Colorado.)

Minimum vertical separation between finished grade against the structure and the bottom of untreated wood products used in construction (i.e. hardboard siding) *(UBC)*:	6"

Slopes for grassed, mulched, and rock landscaped areas:

Areas within 10' of the foundation wall:	5.0% to 33.3%
Areas beyond 10' of the foundation wall:	2.0% to 33.3%

Slopes for concrete and asphalt areas:

Walks:	1.0% to 12.0%
Drives:	1.0% to 14.0%
Steps:	1.0% to 2.0%
Landings:	1.0% to 2.0%
Wheelchair accessible walks (UFAS):	1.0% to 5.0%
Wheelchair accessible ramps (UFAS):	5.0% to 8.3%

(NOTE: All grassed, mulched, and rock landscaped surfaces should be graded to direct drainage away from the foundation and down swale centerlines at the above prescribed slopes beneath the surface materials (i.e. at final grading). Also, all concrete and asphalt surfaces should be graded away from the foundation at a minimum slope of 1.0%.)

(NOTE: The above criteria are not intended to be all-encompassing. Actual guidance references should be consulted for more exhaustive design criteria and interpretations.)

CONVERSION FACTORS:

1.0%	=	about 1/8" per ft.	(1 in 100)
2.0%	=	about 1/4" per ft.	(1 in 50)
5.0%	=	6" in 10 ft.	(1 in 20)
8.3%	=	1 ft. in 12 ft.	(1 in 12)
12.0%	=	about 1 ft. in 8 ft.	(1 in 8)
14.0%	=	about 1 ft. in 7 ft.	(1 in 7)
33.3%	=	1 ft. in 3 ft.	(1 in 3)

Architectural Technical Guide 00013
Exhibit B
GUIDE SURVEYOR'S CERTIFICATION

(A statement with basic content similar to the following should be provided to the Rural Development loan manager by the general contractor at the conclusion of final site grading operations. Such language, provided with or on the actual improvement survey or surveyor's certificate, may be considered acceptable for this purpose. The certification should be performed by a State of Colorado registered land surveyor or professional engineer.)

Concerning the proposed residence located at _____

_____, I have personally verified the

actual final in-place grading, performed by _____
and have determined that it:

_____ Conforms substantially with the originally proposed grading design, with a tolerance of plus or minus 2" vertically,

or

_____ Does not conform substantially with the originally proposed grading design, with a tolerance of plus or minor 2" vertically, due to the following concerns:

_____

_____

_____

or as noted on the attached exhibit, entitled

_____

SIGNED:_____

COLORADO LICENSE NO.:_____

FIRM NAME:_____

FIRM
ADDRESS:_____

FIRM TELEPHONE NO.:_____

DATED:_____

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