



L. Scott Tucker, Executive Director

Guidelines for Maintenance Eligibility Of Flood Control Facilities Constructed By Others September, 2000

Introduction

The Urban Drainage and Flood Control District's (District) policy with regard to the eligibility for District maintenance assistance of flood control facilities constructed by, or approved for construction by, local public bodies is as follows (from Resolution No. 26, Series of 1983):

1. The design of the facility must be in accordance with the "Urban Storm Drainage Criteria Manual" (USDCM).
2. The design of the facility must be approved by the District.
3. A certification acceptable to the District must be provided which certifies that construction of the completed facility has been accomplished in accordance with the approved design.
4. Satisfactory maintenance access and public access easements or rights-of-way must be provided in order to adequately maintain the facility.

When Approval of Design is Required

Any flood control facility constructed by, or approved for construction by, a local public body after March 1, 1980, must be approved by the District to be eligible for District maintenance assistance.

Approval Procedure

Local public bodies have the responsibility to submit to the District designs for proposed flood control facilities to be constructed by, or approved for construction by, the local public body. It is advisable, and highly recommended, that preliminary and final drainage studies be submitted to the District for review and comment prior to beginning final design.

Local public bodies must submit written requests to the District for review of drainage studies and final designs. The District will not review drainage studies or final designs

Board of Directors

Executive Committee:

Cathy Reynolds
Chairman
City/County of Denver

Debra Vickrey
Chairman Pro-Tem
Arapahoe County

Paul Danish
Secretary
Boulder County

Gretchen Cerveny
Treasurer
City of Wheat Ridge

Elaine Valente
Member at Large
Adams County

Members:

Beverly Bradshaw
City of Englewood

Steve Burkholder
City of Lakewood

Noel Busck
City of Thornton

Ken Fellman
City of Arvada

Stephanie Foote
City/County of Denver

Kathy Green
City of Aurora

B. H. Hoffmaster
Engineer

Michelle Lawrence
Jefferson County

Becky Lennon
City of Centennial

Kathleen MacKenzie
City/County of Denver

W. Mike Maxwell
Douglas County

Deborah Ortega
City/County of Denver

Art Patton
Engineer

Susan Spence
Town of Superior

Karen Stuart
City/County
of Broomfield

DENVER, COLORADO 80211-5304
2480 W. 26TH AVENUE, SUITE 156 B
www.udfcd.org
FAX 303-455-7980
TELEPHONE 303-455-6277

submitted by anyone other than the appropriate local public body. District staff will be available for consultation regarding design concepts and procedures.

District staff, or consultants retained by the District, will review drainage studies and final designs for: (1) conformance with the USDCM, (2) provision of adequate maintenance access, (3) compatibility with existing District master plans, (4) availability of adequate public right-of-way, and (5) compliance with local floodplain regulations. Any deficiencies in the drainage studies or final designs will be identified in a letter to the referring agency. The deficiencies must be corrected and revised documents submitted for review and approval.

Acceptable drainage studies will be approved by letter to the referring agency. Acceptable final designs (construction drawings and specifications) will be approved by an "Approval of Design" memorandum (Attachment 1). Design approval will expire if construction does not begin within two years.

Certification Procedure

The flood control facility must be constructed in substantial conformance with the District approved design before it will be deemed eligible for District maintenance assistance. The following procedure will be utilized to assure satisfactory construction.

The local public body must notify the District of the proposed date of start of construction; and must provide names, addresses and phone numbers of the contractor and owner (developer).

The District will have a representative (staff member or consultant) visit the site from time to time as deemed necessary to observe construction techniques and materials for conformance with the approved plans and specifications. Construction deficiencies will be reported in writing to the local public body, which will be responsible for taking the necessary steps to have the deficiencies corrected. Such visits will not relieve the contractor or owner of the obligation to construct the project in accordance with the approved design.

Upon completion of the project, representatives from the District, local public body, contractor and owner (developer) shall conduct a walk-through inspection of the project and shall prepare a list of deficiencies (punch list). The local public body is responsible for arranging the inspection. When the punch list items have been corrected the owner (developer) or local public body should notify the District, and the District representative will conduct a final inspection.

If the construction is satisfactory, a memorandum of "Acceptance of Construction of Project for Maintenance Eligibility" (Attachment 2) will be sent to the local public body. This memorandum does not make the project eligible but gets it into the usual warranty period.

Grass-lined facilities will be eligible for maintenance assistance upon satisfactory completion of seeding in accordance with District specifications and after an adequate vegetative cover has been established.

A final "Certification of Maintenance Eligibility" memorandum (Attachment 3) will be sent to the local public body after an adequate vegetative cover is established and evidence of maintenance access is in hand.

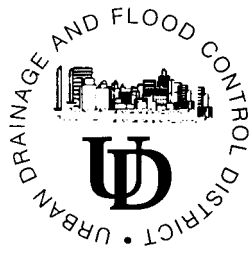
Helpful Hints

As an aid to the design review, construction certification and final acceptance process, submitted final designs and engineering studies should conform to generally accepted standard of care. This means plans should:

1. Be prepared in a legible, organized and coordinated manner,
2. Include hydrologic and hydraulic data on plan, profile and section views,
3. Include hydrologic routing data on detention pond plans,
4. Include site-specific details for hydraulic (outfalls, drop structures, etc.) features, including plan, profile and cross-section views (drawn at 1" = 20' minimum with existing and proposed contours), and
5. Use District construction details when designing grouted boulder drop structures.

Engineering studies should present detailed findings, as opposed to simply directing the reader to the appendix.

Attachment 4 contains design and ownership guidelines for the most common flood control facilities.



L. Scott Tucker, Executive Director

MEMORANDUM

TO:

FROM: Bill DeGroot, Chief, Floodplain Management Program

SUBJECT: Approval of Design

DATE: Use Date That Bill Uses

The construction drawings and specifications for _____ dated _____, are hereby approved. The project will be eligible for District maintenance assistance upon satisfactory construction in accordance with the approved design, as determined by the District. Construction must begin within two years of the date of this memorandum, or the approval will expire. This project may require federal, state or local permits in addition to this design approval.

In order to facilitate observation of the construction of this project we ask that you provide the information requested below on the enclosed copy of this memorandum and return the copy to us with one set of approved construction drawings and specifications as soon as possible.

The District will follow the procedure listed below to ascertain the acceptability of the construction effort. Your assistance with this procedure will be necessary in order to qualify the project for District maintenance assistance. The District staff, or consultants retained by the District, will observe the construction.

1. The District and/or its consultant may conduct field inspections during project construction as deemed necessary to observe construction techniques and materials for conformance with the approved plans and specifications. Construction deficiencies will be reported to your contact who should take the necessary steps to have the deficiencies corrected. Such visits will not relieve you or the contractor of the obligation to construct the project in accordance with the approved design.
2. Upon completion of the project, representatives from the District and/or its consultant, local public body, contractor and owner (developer) shall conduct a walk-through inspection of the project and shall prepare a list of deficiencies (punch list). You are responsible for arranging the inspection.

Board of Directors

Executive Committee:

Cathy Reynolds
Chairman
City/County of Denver

Debra Vickrey
Chairman Pro-Tem
Arapahoe County

Paul Danish
Secretary
Boulder County

Gretchen Cerveny
Treasurer
City of Wheat Ridge

Elaine Valente
Member at Large
Adams County

Members:

Beverly Bradshaw
City of Englewood

Steve Burkholder
City of Lakewood

Noel Busck
City of Thornton

Ken Fellman
City of Arvada

Stephanie Foote
City/County of Denver

Kathy Green
City of Aurora

B. H. Hoffmaster
Engineer

Michelle Lawrence
Jefferson County

Becky Lennon
City of Centennial

Kathleen MacKenzie
City/County of Denver

W. Mike Maxwell
Douglas County

Deborah Ortega
City/County of Denver

Art Patton
Engineer

Susan Spence
Town of Superior

Karen Stuart
City/County
of Broomfield

DENVER, COLORADO 80211-5304
2480 W. 26TH AVENUE, SUITE 156 B
www.udfcd.org
FAX 303-455-7880
TELEPHONE 303-455-6277

3. When the punch list items have been corrected the owner (developer) or local public body should notify the District, and, the District representative will inspect the project again. If the project is satisfactory, written notice of acceptance of the facility for maintenance eligibility will be sent to you.
4. Grass-lined facilities will be eligible for maintenance assistance after an adequate vegetative cover has been established.
5. We recommend that the District representative be given the opportunity to inspect proposed riprap and/or boulders prior to placement for conformance to District criteria.
6. Changes to this approved design can only be made by use of the District's "Notice of Change to Approved Design" form (copy enclosed).

We look forward to working with you on this project.

Bill DeGroot, P. E.
Chief, Floodplain Management

Program

Contact Address Phone

Local Government

Owner (Developer)

Contractor

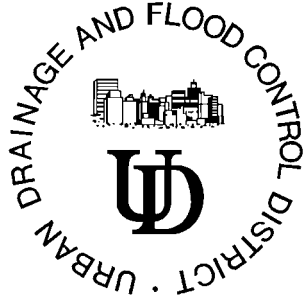
Date of Start of Construction _____

WGD/

Enclosures: Copy of this memo

Sample Notice of Change to Approved Design

cc: Mark Hunter, Urban Drainage and Flood Control District



NOTICE OF CHANGE TO APPROVED DESIGN

Change No. _____

Date: _____

Design Approval Date: _____

NAME OF PROJECT: _____

Description of Change (attach appropriate drawings, specifications and calculations) made to the Approved Design:

Justification:

Impact of change on function of the facility:

APPROVALS REQUIRED:

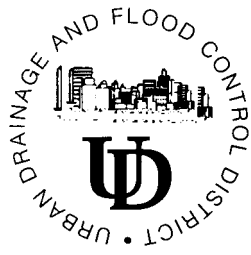
DESIGN ENGINEER

LOCAL GOVERNMENT

CONTRACTOR

UDFCD

cc: Mark Hunter, Urban Drainage and Flood Control District



L. Scott Tucker, Executive Director

MEMORANDUM

TO:

Board of Directors

Executive Committee:

Cathy Reynolds
Chairman
City/County of Denver

Debra Vickrey
Chairman Pro-Tem
Arapahoe County

Paul Danish
Secretary
Boulder County

Gretchen Cerveny
Treasurer
City of Wheat Ridge

Elaine Valente
Member at Large
Adams County

Members:

Beverly Bradshaw
City of Englewood

Steve Burkholder
City of Lakewood

Noel Busck
City of Thornton

Ken Fellman
City of Arvada

Stephanie Foote
City/County of Denver

Kathy Green
City of Aurora

B. H. Hoffmaster
Engineer

Michelle Lawrence
Jefferson County

Becky Lennon
City of Centennial

Kathleen MacKenzie
City/County of Denver

W. Mike Maxwell
Douglas County

Deborah Ortega
City/County of Denver

Art Patton
Engineer

Susan Spence
Town of Superior

Karen Stuart
City/County
of Broomfield

DENVER, COLORADO 80211-5304
2480 W. 26TH AVENUE, SUITE 156 B
www.udfcd.org
FAX 303-455-7880
TELEPHONE 303-455-6277

FROM: Bill DeGroot
Chief, Floodplain Management Program

SUBJECT: Acceptance of Construction of Project for
Maintenance Eligibility

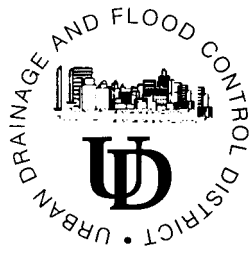
DATE: use date provided

The construction of _____
_____ (Project) at _____
_____ (Location) is accepted for District maintenance assistance.

This acceptance is based upon visual inspection of those elements of the project which are visible to the naked eye, and should not be construed as a certification of the structural integrity of any element of the project. A final determination of maintenance eligibility will be made upon establishment of an adequate vegetative cover. It is your responsibility to advise the District when you feel an adequate cover exists; and we will then arrange to inspect it with you or a representative.

Bill DeGroot, P.E.
Chief, Floodplain Management

WGD/
Enclosure (completion report)
cc: Mark Hunter, UDFCD



L. Scott Tucker, Executive Director

MEMORANDUM

Board of Directors

Executive Committee:

- Cathy Reynolds
Chairman
City/County of Denver
- Debra Vickrey
Chairman Pro-Tem
Arapahoe County
- Paul Danish
Secretary
Boulder County
- Gretchen Cerveny
Treasurer
City of Wheat Ridge
- Elaine Valente
Member at Large
Adams County

Members:

- Beverly Bradshaw
City of Englewood
- Steve Burkholder
City of Lakewood
- Noel Busck
City of Thornton
- Ken Fellman
City of Arvada
- Stephanie Foote
City/County of Denver
- Kathy Green
City of Aurora
- B. H. Hoffmaster
Engineer
- Michelle Lawrence
Jefferson County
- Becky Lennon
City of Centennial
- Kathleen MacKenzie
City/County of Denver
- W. Mike Maxwell
Douglas County
- Deborah Ortega
City/County of Denver
- Art Patton
Engineer
- Susan Spence
Town of Superior
- Karen Stuart
City/County
of Broomfield

2480 W. 26TH AVENUE, SUITE 156 B • DENVER, COLORADO 80211-5304 • www.udfcd.org • TELEPHONE 303-455-6277 • FAX 303-455-7880

TO:

FROM: Bill DeGroot, Chief, Floodplain Management Program

SUBJECT: Certification of Maintenance Eligibility

DATE:

The construction of _____
in Section _____, T_____, R_____, _____ County, Colorado is eligible
for District maintenance assistance. This approval is based upon visual inspection of
those elements of the project which are visible to the naked eye, and should not be
construed as a certification of the structural integrity of any element of the project.

Bill DeGroot, P.E.
Chief, Floodplain Management Program

WGD/
cc: Mark Hunter



L. Scott Tucker, Executive Director

DESIGN AND OWNERSHIP GUIDELINES FOR
APPROVAL OF FLOOD CONTROL
FACILITIES FOR DISTRICT MAINTENANCE ELIGIBILITY

September, 2000

Board of Directors

Open Floodplain Design (Natural Channels)

Executive Committee:

When a developer chooses to stay out of the 100-year floodplain, the following design requirements must be met:

Cathy Reynolds
Chairman
City/County of Denver

Debra Vickrey
Chairman Pro-Tem
Arapahoe County

Paul Danish
Secretary
Boulder County

Gretchen Cerveny
Treasurer
City of Wheat Ridge

Elaine Valente
Member at Large
Adams County

Members:

Beverly Bradshaw
City of Englewood

Steve Burkholder
City of Lakewood

Noel Busck
City of Thornton

Ken Fellman
City of Arvada

Stephanie Foote
City/County of Denver

Kathy Green
City of Aurora

B. H. Hoffmaster
Engineer

Michelle Lawrence
Jefferson County

Becky Lennon
City of Centennial

Kathleen MacKenzie
City/County of Denver

W. Mike Maxwell
Douglas County

Deborah Ortega
City/County of Denver

Art Patton
Engineer

Susan Spence
Town of Superior

Karen Stuart
City/County
of Broomfield

DENVER, COLORADO 80211-5304
2480 W. 26TH AVENUE, SUITE 156 B
www.udfcd.org
FAX 303-455-7980
TELEPHONE 303-455-6277

Open Floodway Design (Natural Channel w/ Floodplain Encroachment)

When a developer chooses to stay out of the floodway while filling and building on the fringe area, he must meet the "Open Floodplain" design requirements (above) plus the following:

The fill slopes must be adequately protected against erosion with a) fill slopes of 4:1 or flatter and vegetated according to USDCM criteria, or b) fill slopes protected by rock (not broken concrete or asphalt) riprap meeting Urban Drainage and Flood Control District (District) criteria up to slopes of 2:1, or c) short (3.5' max. height) retaining walls with adequate foundation protection.

Grass-lined Channel Design

The construction design for a grass-lined channel must meet the following criteria:

- 1. Side slopes must be 4:1 or flatter.

2. Continuous maintenance access, in the form of a trail, must be provided. The trail surface must be at least 8-feet wide with a clear width of ten feet . It need not be paved but it must be of all-weather construction and capable of sustaining loads caused by maintenance equipment. Paved trails are encouraged to allow for recreational use of the trails. Pavement should be 5-inches minimum of concrete. Maximum longitudinal slope for maintenance-only trails is 10%. Maximum slope for multi-purpose recreational trails is 8.33% (ADA may require 5% maximum slope). Under certain circumstances the District will accept adjacent local streets or parking lots in lieu of a trail.
3. A trickle or low flow channel is required. See the USDCM for determination of which to use.
4. Wetland bottom channels are acceptable in certain circumstances when designed according to District wetland bottom channel criteria.
5. The channel bottom cross-slope for dry bottom channels should be at least 2%.
6. Tributary inflow points shall be protected all the way to the trickle or low flow channel to prevent erosion. Inflow facilities to wetland bottom channels shall have their inverts at least 2-feet above the channel bottom to allow for the deposition of sediment, and shall be protected with energy dissipaters.
7. All culvert or bridge crossings of wetland bottom channels shall have their inverts at least two feet above the downstream channel bottom in order to preserve structure capacity in the event of sediment deposition in the channel. The fall shall be taken up with a drop structure or other energy dissipater.
8. All drop structures shall be designed in accordance with the Hydraulic Structures chapter of the USDCM. Underdrain and storm sewer outlets located at the bottom of stilling basins are not acceptable. Construction plans shall utilize District standard details
9. Storm sewer outlets shall be designed in accordance with the Major Drainage chapter of the USDCM. Alternately, the Low Tailwater Riprap Basin design may be used.
10. Grouted riprap rundowns and similar features shall be designed in accordance with "Specifications for Rock and Grout Used in Grouted Riprap."
11. Native grass seeding specifications developed by the District are recommended unless irrigated blue grass is used. The District will not maintain irrigated blue grass (due to cost constraints) but other elements of such a channel (i.e., drop structures, trickle channel) can still qualify for maintenance eligibility.

12. USDCM criteria for maximum depths (five ft.), velocities (five feet per second or seven feet per second, depending on soil conditions), and Froude number (0.8 or less) must be met.

Channel or Floodplain Ownership

Legal maintenance access to the major drainageway facility must be provided to the District according to the following criteria:

1. Ownership of the facility by a public body which has accepted primary maintenance responsibility is preferred.
2. Ownership of the facility by a private entity (such as a homeowners association owning common areas) is acceptable provided that the public body which has accepted primary maintenance responsibility must have a maintenance access easement which allows it to perform maintenance if the owner does not. Easements crossing individual lots are not acceptable.
3. Public body is defined as a local government (city or county), special district (such as a park district) or a metropolitan district which has a service plan that includes drainage facilities as a service which it can provide, and which also has a reliable funding source to fund long term maintenance activities.

Regional Detention Pond Design

The construction design for a regional detention facility must meet the following criteria:

1. A pond will not be recognized by the District as a "regional facility" unless it meets the following standards: a) Controls the entire basin tributary to the pond; b) Controls at least approximately 130 acres or is part of an overall basin master plan, if one exists; and c) has demonstrated a beneficial downstream effect.
2. Designs shall consider the safety of the public.
3. Side slopes must be 4:1 or flatter.
4. Embankment (dam fill) slopes may be as steep as 3:1.
5. Trickle flows must be controlled (trickle channel or pipe). Design capacity must be at least 3% of the inflow discharge. Trickle channels may not be required for retention ponds, wetland bottom ponds or "wet" water quality ponds but the District will provide only limited maintenance assistance of these areas.
6. The longitudinal slope for trickle channels shall be at least 0.4% for concrete bottoms and at least 1% for other bottoms.

7. The pond bottom cross slope shall be at least 2%.
8. Maintenance access ramps to pond bottom must be at least 8' wide and 10% slope or flatter ((max. slope for recreational access is 8.33% (ADA may require 5% max. slope)). The ramp need not be paved but must be of all-weather construction and capable of sustaining loads caused by maintenance equipment. If the ramp is paved it should be five inches of concrete (no asphalt).
9. Inlet/outlet structures must meter the discharges as required by local government criteria.
10. Trash racks must have a net opening area of at least four times the area of the outlet orifice, but in no event less than three square feet. Trash rack bar spacing shall not exceed six inches and shall be no larger than half the diameter of the outlet orifice.
11. Tributary inflow points to the ponds shall be adequately protected to prevent erosion. Storm sewer outlets shall be designed in accordance with the Major Drainage chapter of the USDCM. Alternately , the Low Tailwater Riprap Basin design may be used. Inflow facilities to wetland bottom ponds shall have their inverts at least 2-feet above the pond bottom to allow for deposition of sediment.
12. Regional water quality ponds may also be eligible. Tributary basins should range between 130 acres and 640 acres. Designs outside the specified range will require prior consultation with District staff. The following policies apply to water quality facilities:
 - a. "Dry" water quality ponds constructed within the flood pool of larger water quantity facilities will be considered for eligibility for 100% District maintenance funding provided they are designed for the entire tributary drainage area and designed in accordance with the appropriate sections of Volume 3 of the USDCM.
 - b. "Dry" water quality ponds designed and constructed specifically for water quality purposes will be eligible for 100% District funded maintenance provided that they are regional in nature, designed for the entire tributary watershed, and designed in accordance with the appropriate sections of Volume 3 of the USDCM.
 - c. "Wet" water quality ponds (those with a permanent pool), whether constructed within a larger water quantity facility or as a primary water quality facility, will be eligible for 100% District funded maintenance of all hydraulic features (such as outlet works) and removal of sediment above the normal water surface elevation; and will be eligible for 25% District funding of sediment removal below the normal high water line; provided that they meet the standards of being

regional facilities designed for the entire tributary area and designed in accordance with the appropriate sections of Volume 3 of the USDCM.

13. District maintenance will be limited to the level required for the facility to function as a detention pond. No formal park level of maintenance will be performed. However, formal park-use of detention facilities will not be discouraged, and in fact will be encouraged.

Regional Detention Pond Ownership

Legal maintenance access to the detention facility must be provided to the District according to the following criteria:

1. Ownership of the facility by a public body which has accepted primary maintenance responsibility is preferred.
2. Ownership of the facility by a private entity (such as a homeowners association owning common areas) is acceptable provided that the public body which has accepted primary maintenance responsibility has a maintenance access easement which allows it to perform maintenance if the owner does not. Easements crossing individual lots are not acceptable.
3. Public body is defined as a local government (city or county), special district (such as a park district) or a metropolitan district which has a service plan that includes drainage facilities as a service which it can provide, and which also has a reliable funding source to fund maintenance activities.

Conduits

Conduits will generally not be eligible for District maintenance assistance. However, the following criteria can be followed by anyone considering conduits:

1. At this time, because of funding limitations, local storm sewer systems will not be considered for District maintenance eligibility unless District funds were used in the construction of the facility. In any case, crosspans, inlets and connector pipes will not be eligible. Outlets of local storm sewer systems to eligible channels or ponds will be considered for maintenance eligibility if adequate erosion protection is provided.
2. Major drainageways (tributary area of 130 acres or more) placed in conduits by developers (in other words, not a remedial project) will not be considered for District maintenance eligibility.

3. Pipes used for control of trickle flows in open channel major drainageways, while discouraged, will be eligible for maintenance assistance as a part of the overall major drainageway construction project. Minimum pipe size allowed is 24 inches. Cleanouts or manholes must be placed at all changes in direction or slope and at no more than 500-foot intervals in straight reaches. Inlets to intercept local drainage to keep the channel bottom dry must be provided at no less than 200-foot intervals.
4. For major drainageways with very steep longitudinal slopes (2.5%) the District will consider, on a case-by-case basis, conduits which are designed for the 100-year discharge and which also have an unobstructed 100-year open space swale (i.e., not a roadway) over the top of the pipe. The swale need not meet grass-lined channel criteria.
5. For roadway crossings the District will review the entrance and exit design for maintenance eligibility. Therefore, all culvert features except the barrel section will be considered for District maintenance eligibility.