



INFORMATION PACKET ON
DEVELOPMENT WITHIN THE
FLOODWAY

Procedures for “No-Rise” Certification and
Conveyance Calculations

Kenai Peninsula Borough

October 2009



FEMA

US Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021

Procedures for "No-Rise" Certification **For Proposed Developments in the Regulatory Floodway**

Section 60.3 (d) (3) of the National Flood Insurance Program (NFIP) regulations states that a community shall "prohibit encroachments, including fill, new construction, substantial improvements and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base (100-year) flood discharge."

Prior to issuing any building, grading or development permits involving activities in a regulatory floodway the community must obtain a certification stating the proposed development will not impact the pre-project base flood elevations, floodway elevations, or floodway data widths. The certification should be obtained from the applicant and be signed and sealed by a professional engineer.

The engineering or "no-rise" certification must be supported by technical data.

The supporting technical data should be based upon hydraulic analyses that utilize the same model used to prepare the effective Flood Insurance Study (FIS) report and Flood Insurance Rate Map (FIRM) unless it is demonstrated that the 'effective' hydraulic model is unavailable or its use is inappropriate. If an alternative hydraulic model is used, the new model must be calibrated to reproduce the FIS profiles within 0.5 feet. Hydraulic model used in the analysis must be on FEMA's accepted models list, or documentation must be provided showing the model meets the requirements of NFIP regulation 65.6(a)(6).

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Although communities are required to review and approve the "no-rise" submittals, they may request, in writing, technical assistance and review from the FEMA regional office. However, if this alternative is chosen, the community must review the technical submittal package and verify that all supporting data, listed in the following paragraphs, are included in the package before forwarding to FEMA.

To support a "no-rise" certification for proposed developments encroaching into the regulatory floodway, a community will require that the following procedures be followed:

1. Current Effective Model: Submit a written request for the effective model for the specified stream and community, identifying the limits of the requested data. A fee will be assessed for providing the data. Data request forms and instructions can be obtained at:

http://www.floodmaps.fema.gov/fhm/frm_forms.shtml#5

or by writing to:

FEMA Engineering Library
847 South Pickett St.
Alexandria, Virginia 22304
Fax (703) 212-4090

2. Duplicate Effective Model: Upon receipt of the effective computer model, the engineer should run the original model to duplicate the output in the effective (FIS).
3. Corrected Effective Model: The model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections, or incorporates more detailed topographic information than that used in the current effective model. Floodway limits should be manually set at the new cross-section locations by measuring from the effective FIRM or FBFM. The cumulative reach lengths of the stream should also remain unchanged. The Corrected Effective model must not reflect any man-made physical changes since the date of the effective model.
4. Existing, or Pre-Project Conditions Model: Revise the Duplicate Effective or the Corrected Effective model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project. If no modifications have occurred since the date of the effective model, then the model would be identical to the Duplicate Effective or Corrected Effective model. The results of this Existing Conditions analysis will indicate the 100-yr elevations at the project site.

5. Proposed, or Post-Project Conditions Model: Modify the Existing Condition or Pre-Project Conditions Model (or Duplicate Effective model or Corrected Effective model, as appropriate) to reflect revised or post-project conditions. The overbank roughness coefficients should remain the same unless a reasonable explanation of how the proposed development will impact Manning's "n" values is included with the supporting data. The results of this analysis will indicate the 100-year elevation for proposed conditions at the project site. These results must indicate NO impact on the 100-year floodway elevations when compared to the Existing Conditions or Pre-Project Conditions model. If an increase results the project will require the submittal of a CLOMR prior to the start of the project.

The "no-rise" supporting data and a copy of the engineering certification must be submitted to and reviewed by the appropriate community official prior to issuing a permit.

The "no-rise" supporting data should include, but may not be limited to:

- 1) Copy of the Duplicate Effective model;
- 2) Copy of the Corrected Effective model;
- 3) Existing conditions, or Pre-Project conditions model
- 4) Proposed conditions or Post-Project conditions model.
- 5) FIRM and topographic map, showing floodplain and floodway, the additional cross-sections, the site location with the proposed topographic modification superimposed onto the maps, and a copy of the effective FIRM or FBFM showing the current regulatory floodway.
- 6) Documentation clearly stating analysis procedures. All modifications made to the original FIS model to represent revised existing conditions, as well as those made to the revised existing conditions model to represent proposed conditions, should be well documented and submitted with all supporting data.
- 7) Copy of effective Floodway Data Table copied from the (FIS) report.
- 8) Statement defining source of additional cross-section topographic data and supporting information.
- 9) Cross-section plots, of the added cross sections, for revised existing and proposed conditions.
- 10) Certified planimetric (boundary survey) information indicating the location of structures on the property.

- 11) Copy of the source from which input for original FIS model was taken.
- 12) CD with all input and output files.
- 13) Printout of output files from EDIT runs for all three floodway models.

The engineering "no-rise" certification and-supporting technical data must stipulate NO impact on the 100-year flood or floodway elevations at the new cross-sections and at all existing cross-sections anywhere in the model. Therefore, the revised computer model should be run for a sufficient distance (usually one mile, depending on hydraulic slope of the stream) upstream and downstream of the development site to insure proper "no-rise" certification.

Attached is a sample "no-rise" certification form that can be completed by a registered professional engineer and supplied to the community along with the supporting technical data when applying for a development permit.

ENGINEERING "NO-RISE" CERTIFICATION

This is to certify that I am a duly qualified engineer licensed to practice in the State of _____.

It is to further certify that the attached technical data supports the fact that proposed _____ will
(Name of Development)

not impact the 100-year flood elevations, floodway elevations and floodway widths on _____ at published sections
(Name of Stream)

in the Flood Insurance Study for _____,
(Name of Community)

dated _____ and will not impact the 100-year flood elevations, floodway elevations, and floodway widths at unpublished cross-sections in the vicinity of the proposed development.

Attached are the following documents that support my findings:

(Date)

(Signature)

(Title)

seal:

(Address)

Subject CONVEYANCE CALCULATIONEXAMPLE NO. 1Sheet No. 1 of _____PROPOSED FLOODWAY FILL

Drawing No. _____

Computed by RCH Checked By JTPDate 5.14.90RIGHT OVERBANK CONVEYANCE (PRE-DEVELOPMENT)

- ASSUMPTIONS :
1. PORTION OF FILL IN FLOODWAY FRINGE IS ALLOWABLE AND IS ACCOUNTED FOR IN FLOODWAY SURCHARGE
 2. PREDEVELOPMENT CONVEYANCE SHOULD ASSUME EXISTENCE OF WETTED PERIMETER ALONG FLOODWAY BOUNDARY
 3. MAXIMUM CONVEYANCE LOSS WILL OCCUR IN CONJUNCTION WITH FLOODWAY DEPTH THEREFORE USE FLOODWAY WATER SURFACE ELEVATION IN COMPUTATION
 4. CONVEYANCE LOSSES COMPUTED WITH FLOODWAY WATER SURFACE ELEVATION AND PROPERLY COMPENSATED FOR WILL NOT INCREASE 100-YEAR (BASE FLOOD) ELEVATION

THEREFORE:

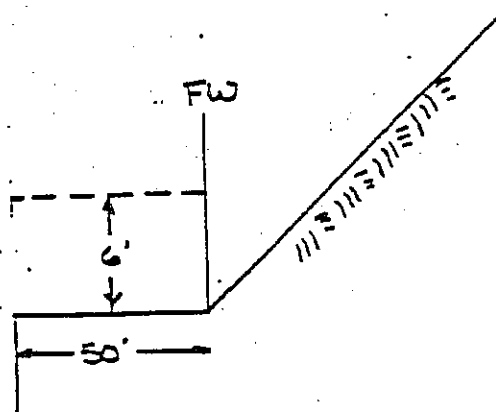
$$K_{PRE} = 1.49 / N A R^{2/3}$$

$$A = 50 \times 6 = 300 \text{ FT}^2$$

$$WP = 50 + 6 = 56 \text{ FT}$$

$$R = 300 / 56 = 5.36 \quad R^{2/3} = 3.06$$

$$K_{PRE} = 1.49 / .050 (300) (3.06) = \underline{27356.40 \text{ CFS}}$$



Subject: CONVEYANCE CALCULATIONEXAMPLE NO. 7Sheet No. 2 of _____PROPOSED FLOODWAY FILL

Drawing No. _____

Computed by RCHChecked By JTPDate 5-14-90RIGHT OVERBANK CONVEYANCE (POST-DEVELOPMENT)

ASSUMPTIONS: 1. ALL PREVIOUS

2. PROPOSED FILL SLOPES ABOVE FLOODWAY WATER SURFACE ELEVATION AND OUTSIDE FLOODWAY LIMIT DO NOT CONTRIBUTE TO WETTED PERIMETER

THEREFORE:

$$K_{POST} = 1.49/N AR^{2/3}$$

$$A = (1)(50) + \frac{1}{2}(5)(50+37.5)$$

$$= 268.75 \text{ FT}^2$$

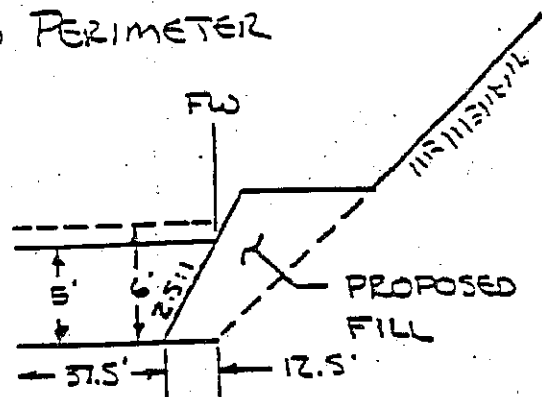
$$WP = 37.5 + (12.5^2 + 5^2)^{1/2} + 0 = 50.96$$

$$R = 268.75 / 50.96 = 5.27 \quad R^{2/3} = 3.03$$

$$K_{POST} = 1.49 / 0.05 (268.75) (3.03) = \underline{\underline{24,266.51}}$$

TOTAL CONVEYANCE LOSS IN FLOODWAY

$$K_{PRE} - K_{POST} = 27,356.40 - 24,266.51 = \underline{\underline{3089.89 \text{ CF}}}$$



Subject: CONVEYANCE CALCULATION

EXAMPLE NO. 2 Sheet No. 3 of _____

PROPOSED BRIDGE PIER Drawing No. _____

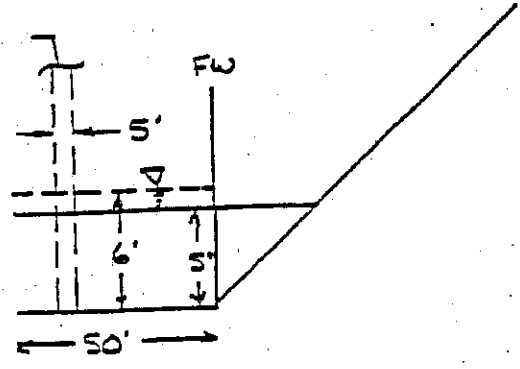
Computed by RCH Checked By JTP Date 5.14.90

RIGHT OVBANK CONVEYANCE (PRE-DEVELOPMENT)

SAME AS EXAMPLE NO. 1 = 27356.40 CFS

RIGHT OVBANK CONVEYANCE (POST-DEVELOPMENT)

PROPOSED
PIER
CONCRETE



$$A = (6)(50) - (6)(5)$$

$$= 300 - 30 = 270 \text{ FT}^2$$

$$WP = (50 - 5) + 2(6) + 6$$

$$= 63 \text{ FT}$$

$$R = 270 / 63 = 4.29 \quad R^{2/3} = 2.64$$

WEIGHTED "N"

"N" ROB : .050 $(50 - 5) + 6 = 51$

$$51 + 12 = 63 = WP$$

"N" CONC. : .013 $2(6) = 12$

$$N_w = \frac{51}{63} (.050) + \frac{12}{63} (.013) = .043$$

$$K_{POST} = 1.49 / .043 (270) (2.64) = \underline{24,699.35 \text{ CFS}}$$

TOTAL CONVEYANCE LOSS IN FLOODWAY

$$K_{PRE} - K_{POST} = 27356.40 - 24699.35 = 2657.05$$

- HIGH DANGER ZONE** - Occupants of most houses are in danger from floodwater.
- JUDGEMENT ZONE** - Danger level is based upon engineering judgement.
- LOW DANGER ZONE** - Occupants of most houses are not seriously in danger from flood water.

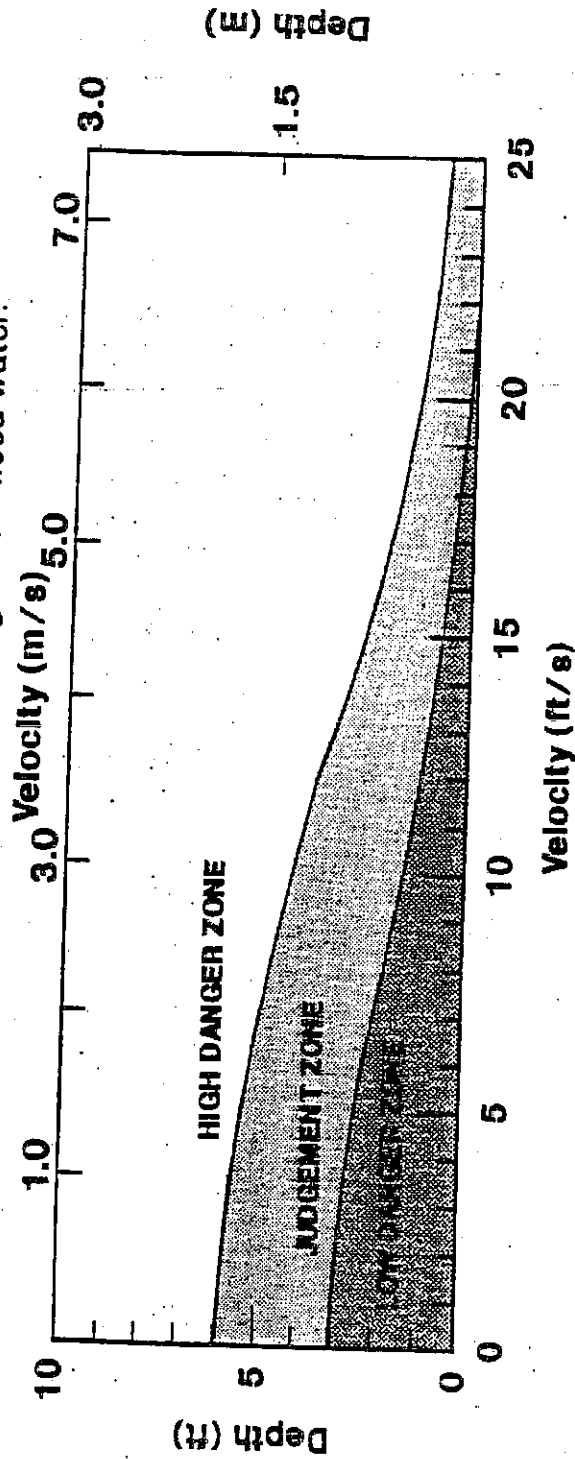


Figure 2. - Depth-velocity flood danger level relationship for houses built on foundations.