Floodplain Management Development Review for Transportation Projects

Regulations, Data, & Implementing Compliance
Floodplain Regulations
Directives and Their Applicability to Transportation Projects
Floodplain Regulations

- National Flood Insurance Program (NFIP)
  - Over 750 Ohio communities (municipalities & unincorporated counties) participate in the NFIP
  - Administered nationally by FEMA, statewide by ODNR, & locally by communities
  - Community participation is based on local adoption/administration of floodplain ordinance/resolution (based on minimum federal criteria) in exchange for availability of federal flood insurance & disaster assistance
    - Communities can & often adopt standards that exceed the minimum NFIP criteria
Ordinance/resolution outlines standards for all development proposed within the 1%-annual-chance-floodplain (aka 100-year floodplain, Special Flood Hazard Area (SFHA), etc...)

- 1%-annual-chance-floodplain is identified on Flood Insurance Rate Maps (FIRM) & Flood Insurance Study (FIS) issued by FEMA

- FIRM & FIS are legal basis for determining whether development is located in the 1%-annual-chance-floodplain
Under the NFIP is defined as:

- Any man-made change to improved or unimproved real estate, including but not limited to:
  - Mining
  - Dredging
  - Filling
  - Grading
  - Paving
  - Excavating
  - Drilling operations
  - Temporary/permanent storage of equipment or materials
Development cont...

- Placement of new buildings & other structures including:
  - Tanks
  - Accessory structures
  - Manufactured homes
  - & the methods of construction
- Additions, repairs or renovations to existing structures, when such actions are classified as substantial improvements (improved to 50% or more of market value)
Repair & restoration of existing buildings that have been substantially damaged (damaged to 50% or more of pre-flood market value) by any cause (flood, fire, wind, tornado, or other damaging event)

Installation of water & sewer utilities, & other site improvements

Construction or modification of flood control works, including levees, floodwalls, & channels

Construction, modification/replacement of roads, bridges, & culverts

Any related activities that may affect the floodplain, especially those activities that may increase the level of the 100-year flood
The level of FPM requirements are directly tied to the level of data (i.e. flood zone) that has been delineated on the FIRM

- Different flood zones A, AE with or without floodway, etc... trigger different requirements
  - Zone A – no Base Flood Elevations (BFE) or floodway
  - Zone AE – BFEs provided (with or without floodway)
Many “transportation projects” meet the NFIP definition of development.

Development must be evaluated for compliance with locally floodplain management standards.

WHO regulates/evaluates the proposed development for compliance?
- Depends on WHO is performing the development...
## Who Regulates?

<table>
<thead>
<tr>
<th>Development Undertaken by:</th>
<th>Regulated/Evaluated for Compliance by:</th>
<th>Floodplain Development Permit Required by Community?</th>
<th>Level of Standards for Compliance:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Agency</td>
<td>EO11988/EO13690</td>
<td>No</td>
<td>Federal Flood Risk Management Standard</td>
</tr>
<tr>
<td>Federal Agency Contractor</td>
<td>EO11988/EO13690</td>
<td>No</td>
<td>Federal Flood Risk Management Standard</td>
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<tr>
<td>State Agency</td>
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<td>No, but compliance must be verifiable*</td>
<td>Minimum NFIP + ANY higher standards specified in the community floodplain ordinance/resolution</td>
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<td>No, but compliance must be verifiable*</td>
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<tr>
<td>Community</td>
<td>Floodplain Manager</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Private Citizen or Corporation</td>
<td>Floodplain Manager</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

*FEMA or communities may request documentation that verifies that the development has been constructed in compliance with locally adopted floodplain management regulations. Coordination with the community Floodplain Manager is necessary.*
State Agency Compliance

- ORC 1521.13(D)(3) states
  - “Before awarding funding or financing or granting a license, permit, or other authorization for development that is or is to be located within a 100-year floodplain, a state agency shall require the applicant to demonstrate to the satisfaction of the agency that the development will comply with [minimum NFIP regulations] & any applicable local floodplain management resolution or ordinance.”
How does it work?

- State agencies are required to comply with minimum NFIP criteria plus any additional floodplain management regulations adopted by a community (ORC 1521.13), HOWEVER
- State agencies are not “required” to work through community floodplain development permitting process & obtain local floodplain development permit
ODOT’s Approach

- ODOT developed an internal self-permitting process to review development proposed in the 100-year floodplain to ensure compliance
- L&D Manual
  - Revised to include guidance on reviewing development proposed within the 100-year floodplain
  - *Section 1005 Highway Encroachment on Floodplains* now includes additional information on the process & criteria for compliance
Self-Permitting

- Detailed review & thorough documentation
- Required documentation tied to Flood Zone
  - Letter of Compliance (Form LD-51) &/or variance request
  - Calculations assuring carrying capacity (if applicable)
  - Hydrologic & Hydraulic calculations (if applicable)
  - No-Rise Certification (Form LD-50) (if applicable)
Coordination

- ODOT has been working to expand the agency’s proficiency with floodplain management regulations
- ODNR provides technical assistance regarding interpretation & application of regulations as well as coordination with communities upon request
Data Sources
Hydrologic and Hydraulic Information Supporting Floodplain Management
Things to Consider

- Effective Studies
  - New information available?
  - Topography?
  - Development?
  - Coordinated Needs Management Strategy
- Effective Zones
  - Zone A / Zone AE
- Local Higher Standards
Things to Consider

- **Zone A** – Majority of the State model backed
  - Hydrology – Regression, Gage analysis
  - Hydraulics - HEC RAS / SWMM

- **Zone AE** – many different models
  - HEC-2, WSP-2, HEC RAS, SWMM
  - Many times not in digital format
  - Electronic Data Request
Hydrology

- Estimate of flow volumes and flow rates at a given point of interest. Answers how much?
Effective flows
- From FIS or existing study
- Develop new flows
- Regression, Gage analysis, Rainfall Runoff
Hydrology

- Statistical (Gage) Analysis
  - 17B
- Regression Analysis
  - SIR2006-5312
- StreamStats
- Rainfall-Runoff
  - HEC-HMS, HEC-1, TR-20
Hydrology

- Hydrology is an inexact science
- Variety of methods
- Results highly variable, many factors:
  - Rainfall, soil type, land use, slope, basin area
  - Check Tie-ins with existing flows
Hydraulics

- The analysis of how water moves through a system (river). Answers how high?
Hydraulics

- Determination of Base Flood Elevations (BFEs)
- Facility design such as dams, levees, bridges, culverts, storm detention ponds, etc.
- Environmental issues such as stream restoration and bank stabilization
- Many other applications
Hydraulics

- Roughness (Manning’s n)
- Losses
- Flow area
- Wetted perimeter
- Slope
- Hydraulic structures
- Bridges
- Culverts
- Dams
- Others
Hydraulics

- Normal depth (Manning’s equation)
- Most common hydraulic method is 1-Dimensional step backwater analysis (HEC-RAS)
- 2-Dimensional conservation of volume models (FLO-2D)
Data Sources

- FEMA Library (EDR)
- OGRIP, OSIP data – Ortho’s and LiDAR
- Local Counties and Municipalities
- USGS Stream Stats program
- National Land Cover Dataset (NLCD)
- NRCS – Soils data
Potential Issues

- Tie-in’s for both Hydrology and hydraulics
- Potential raises in BFE due to changes
- Floodways
Compliance
Implementing ODOT’s Self-Permit Program
Work actually starts in PE Phase

PDP Manual first mentions Floodplain Coordination in EE Phase
Three primary activity periods:

- Scoping & Proposal Stage
- PE Phase
- EE Phase
1. Scoping / Proposal

Review FIRM Panel to Determine if Project is Located in a Floodplain
1. Scoping / Proposal

1005 Highway Encroachments on Flood Plains

1005.1 General

The requirements of the Code of Federal Regulations, Volume 23, Part 650A, shall be followed for all projects. All highways that encroach on floodplains, bodies of water or streams, shall be designed to permit conveyance of the 100-year flood without causing significant damage to the highway, the watercourse, body of water or other property.

Hydraulically design structures and/or channels to convey the design-year discharge. Ensure the structure and/or channel will convey the 100-year discharge without causing property damage. Inundation of the highway is acceptable for the 100-year discharge, but it is not permitted for the design-year discharge. Water surface elevations caused by existing structures do not have to be lowered to meet the 100-year discharge.

Longitudinal highway encroachments require alternative location studies to be summarized in the Feasibility Study (L&D Section 1403.3).
1. Scoping / Proposal

<table>
<thead>
<tr>
<th>Zone</th>
<th>Allowable Increase in 100-Year Peak Flood Elevations*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.00 ft or allowable surcharge, whichever is less</td>
</tr>
<tr>
<td>AE without floodway</td>
<td>Allowable surcharge</td>
</tr>
<tr>
<td>AE with floodway, project is located within the floodway</td>
<td>0.00 ft</td>
</tr>
<tr>
<td>AE with floodway, project is not located within the floodway</td>
<td>Allowable surcharge**</td>
</tr>
</tbody>
</table>
1. Scoping / Proposal

Review Local Floodplain Regulations
# ODOT PDP

## 2. PE Phase

<table>
<thead>
<tr>
<th>Initial Formal Coordination</th>
<th>Potential Higher Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Discuss proposed project and local regulations with local floodplain coordinator</td>
<td>- Freeboard</td>
</tr>
<tr>
<td>- Be aware of higher standards</td>
<td>- Compensatory Storage</td>
</tr>
<tr>
<td></td>
<td>- Post-Project Requirements</td>
</tr>
</tbody>
</table>
3. EE Phase (Stage 1 End / Stage 2 Start)
   - Project development
   - Hydraulic calculations
   - Final floodplain coordination
Overview (L&D Section 1005.1.3)
No-Rise Certification (Form LD-50)
Letter of Compliance (Form LD-51)
Documentation Maintenance
### ODOT Self Permit Process

**L&D Vol. 2, Sec. 1005.1.3**

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Floodplain Coordination Final Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Led Project</td>
<td>1) Submit to local jurisdiction a letter of compliance with supporting hydraulic calculations, or</td>
</tr>
<tr>
<td></td>
<td>2) Obtain variance from local jurisdiction</td>
</tr>
<tr>
<td>Local Administered Project</td>
<td>Obtain Local Floodplain Permit</td>
</tr>
</tbody>
</table>

**WARNING:**
Variance may trigger CLOMR / LOMR process!

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ORC 1521.13 requires state agencies to **demonstrate compliance** with local floodplain management requirements.
No-Rise Certification

This is to certify that I am a qualified licensed professional engineer in the State of Ohio. It is to further certify that the attached analysis supports the fact that the proposed Roadway project: 

(Name of Project)

in the floodway will not increase the Base Flood Elevation (100-year flood), floodway elevation, or floodway widths on 

(Name of Stream)

at published sections in the Flood Insurance Study for 

(Name of Community)

dated 

and will not increase the Base Flood Elevations (100-year flood), floodway elevations, or floodway widths at unpublished cross-sections in the vicinity of the proposed roadway project.
Date

Name of Floodplain Coordinator
Title
County or Municipality Name
Address Line 1
Address Line 2

Re: County-Route-Section (PID)
Letter of Compliance

Dear Name of Floodplain Coordinator:

Enclosed please find the floodplain analysis for ODOT project County-Route-Section (PID). The subject roadway project encroaches upon Special Flood Hazard Area Zone A or AE within your community at the location identified in the attached report. The hydraulic calculations and No-Rise Certification Form (if Zone AE) provide the necessary documentation of compliance to all federal, state, and local floodplain standards as required. We will be proceeding forward on this project if no concerns are brought to our attention.

If you need additional information please contact contact information as needed.

Respectfully,

Name of Registered Engineer, P.E.
Title
ODOT Self Permit Process

Construction within Zone A or AE requires:
- Compliance with federal, state and local floodplain standards
- ODOT self-permit documentation
- Local floodplain coordination
- Potential coordination with FEMA and ODNR
Variances:

- Consult with the ODOT Office of Hydraulic Engineering if local floodplain requirements cannot be met.
ODOT Self Permit Process

Documentation Maintenance:
- When floodplain coordination is required, Project Managers must ensure the following documents are archived with the project, as applicable:
  ✓ Hydraulic Report
  ✓ Form LD-50
  ✓ Form LD-51
  ✓ Variance Documentation

FEMA may audit ODOT’s files to verify compliance
Begin floodplain coordination activities early to fully understand how local regulations may affect the project.

- Communicate with local jurisdiction throughout project.
- Request concurrence from local jurisdiction on any submittals.