District 88
Willowbrook High School

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wightco.com
Floodplain Players and Bio’s

- DuPage County – Local Floodway and Wetland Authority
- Villa Park – Local Floodplain Authority
- IDNR – State Floodway Authority
- FEMA – Federal Administrator of Nation Flood Insurance Program
- Christopher Burke (CBBEL) – FEQ Specialist
- Wight & Company – Project Manager & HEC Consultant
- Owner/Client, Build Partner, Design Disciplines
Site Orientation
FEQ BASED
Building Addition in Floodplain
Who makes which rules?

- DuPage County – Local stormwater ordinance.
- IDNR – Floodway rules.
- FEMA – Minimum ordinance requirements and ordinance administration rules for certified communities.
Why can’t we bend the rules for schools?

- To remain certified, a community must meet the minimum NFIP requirements for floodplain development regulation.
- If a community (DuPage or Villa Park) loses certification, then it loses flood insurance benefits for its residents.
- FEMA audits floodplain permit records to verify rules are followed.
What are some of the rules?

- DuPage County – Flood protection elevation (FPE) = Base flood elevation (BFE) + 1’.
- DuPage County – No adverse impacts downstream or upstream demonstrated by FEQ computer model.
- DuPage County – Compensatory storage.
- DuPage County and IDNR – Appropriate uses in floodway.
Existing Preconditions

- Finished Floor Elevation = 688.69
- FEMA Flood Insurance Study (FIS) 100-Year base flood elevation = 690.80

- 690.8 > 688.69 = Floodplain Problems
Why is this a problem?

- Flood Risk has been identified (SFHA)
- Additions must be built to the FPE, where FPE = 691.8, existing finished floor = 688.7
- Compensatory Storage is calculated based on the FIS BFE
- Substantial improvements require that the existing building is brought into flood protection compliance.
Elevate this? 450,000 SF?
The tale of two models:

- FEMA prepared FIS study with HEC-2 computer program (determines BFE and FIS profile)
- DuPage requires FEQ model for any floodway improvements (determine feasibility of improvement)
- FEMA accepts HEC results but not FEQ for Sugar Creek (or didn’t)
- DuPage will require HEC and FEQ for our improvement, both must demonstrate compliance with rules
Original Plan

- Verify Base Flood Elevations (BFE’s), revise as necessary.
- Determine if there are feasible drainage improvements available to improve BFE (alternative analysis).
- Determine scope of flood protection required.
- Obtain a CLOMR* and/or LOMR* for revised BFE’s –
- Obtain a permit based on CLOMR and /or LOMR BFE and FEQ results
- Obtain a Letter of Map Revision (LOMR) after construction.
- While easy to spell, the CLOMR/LOMR process can be difficult and arduous. Success isn’t guaranteed.
Initial Process

• Researched original HEC model development.
• Revised HEC model based on current survey
• Prepared FEQ analysis for various “Improvement Scenario’s”
• Developed feasible drainage improvement plan which results in lower BFE’s and is DuPage ordinance compliant
• Continuous communications with regulatory agencies
Scenario Considerations

- Remove channel restrictions
- Flood proofing – Structural
- Flood proofing – Non-structural (if feasible)
- Reservoir routing AKA combined detention and compensatory storage
Substantial Improvement

• How to estimate replacement cost of a large public building?
  Keep it simple -
  Rough cost would be $230/SF*

455,475 SF x $230 /SF= $104,759,250

* Based on historic data for similar structures WCS
Substantial Improvement

• Construction Hard Cost – Life Safety Items + Improvements since 1992 = Cost of Improvement

$38,477,132.00^1 - $646,219.20^2 + 1,834,205.00^3 + $3,670,000.00^4 / $104,759,250

= 41%.......phew

1 Based on Bid Results
2 Based on Bid Results
3 Historic Budget Records
4 Typical Annual Budget Special Projects
Flood Doors – Design Build

Flood Doors – Design Build

AREA OF FLOOD DOOR INSTALLATION
Note cross section locations....
AN INDICATION SOMETHING WAS OFF

From ISWS
ORIGINAL MODEL CROSS-SECTION – SCS 008

From ISWS
MAYBE ENGINEERS DO SPEAK A DIFFERENT LANGUAGE?
ORIGINAL RECOMMENDED
ALTERNATIVE

RESERVOIR

BASIS FOR GMAX
Proposed Conditions Including Revision

- Existing Finished Floor Elevation = 688.69
- LOMR Proposed 100-Year Base Flood Elevation = 687.10
- 687.10 < 688.69 = Problems Minimized
Extended Analysis

1. FEMA Pre-LOMR Regulatory model HEC 2 - 690.6 - BFE
2. FEMA LOMR Regulatory Model HEC 2 687.1 BFE
3. Wight Modified Existing Conditions HEC 2 687.1 BFE
4. Wight Proposed Conditions HEC 2 687.1 BFE
5. Provisional PVSTATs 688.17 BFE
6. DuPage FEQ Model August 1972 event - 688.66 Flood of Record
7. DuPage FEQ Enhanced - 688.79 Flood of Record
8. DuPage FEQ Proposed- 688.78 Flood of Record

The finished floor/Flood Protection Elevation of the building addition was determined by selecting the best available information between: 1) BFE +1 or 2) flood of record elevation.

Therefore the most conservative flood protection elevation at the field house addition was determined to be 688.17 + 1 = 689.17 The design finished floor is at elevation 689.30
End Result

- Errors in the existing condition model were discovered
- School decided that they would prefer to maintain multiple stream crossings if possible
- Profile improvements caused by culvert removal did not offset loss of access
- Final solution - Provide online detention and compensatory storage, raise new building addition to higher Flood Protection Elevation.
- Documented Project would not qualify as substantial improvement.
- Provide Flood Doors for Existing School
- Model Revisions incorporated into County Study
1.5 Years later…. Building remains in floodplain
Lesson learned – Setting expectations and the value of value engineering
Lessons Learned

- Set the Owner and Team expectation
- Not Design-Build friendly project – be aware of pricing based on over simplification.
- If you draw it they will price it……
- Be careful of tight flood intervals NWL-10, 10-100
- Make the conversion to HEC- RAS
- CLOMR require Hydraulics & Hydrology
Thank you!

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