



**FEMA**

## **No-Impact: Hydraulic Modeling**

# No-Impact/ No-Rise

**A Document Used to show that a proposed project will result in “no-impact” in the 1% annual chance flood and floodway elevations or floodway widths and locations**

**See RIV Guidance Document**



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**Risk MAP<sup>2</sup>**

# General Overview

## No-Rise Conditions

- **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 developments 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.”***

# General Overview

## No-Rise Conditions (Continued)

- **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 permittee and signed and sealed by a professional engineer.

# General Conditions

## No-Rise Conditions (Continued)

- **The engineering or “no-rise” certification must be supported by technical data.**
  - Based upon the standard step-backwater computer model utilized to develop the 100-year floodway shown on the community’s effective Flood Insurance Rate Map (FIRM) or Flood Boundary and Floodway Map (FBFM)
  - and the results tabulated in the community’s Flood Insurance Study (FIS).

# No-Impact

**“No-Rise” = “No-Impact”**



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**Risk MAP**

# Example



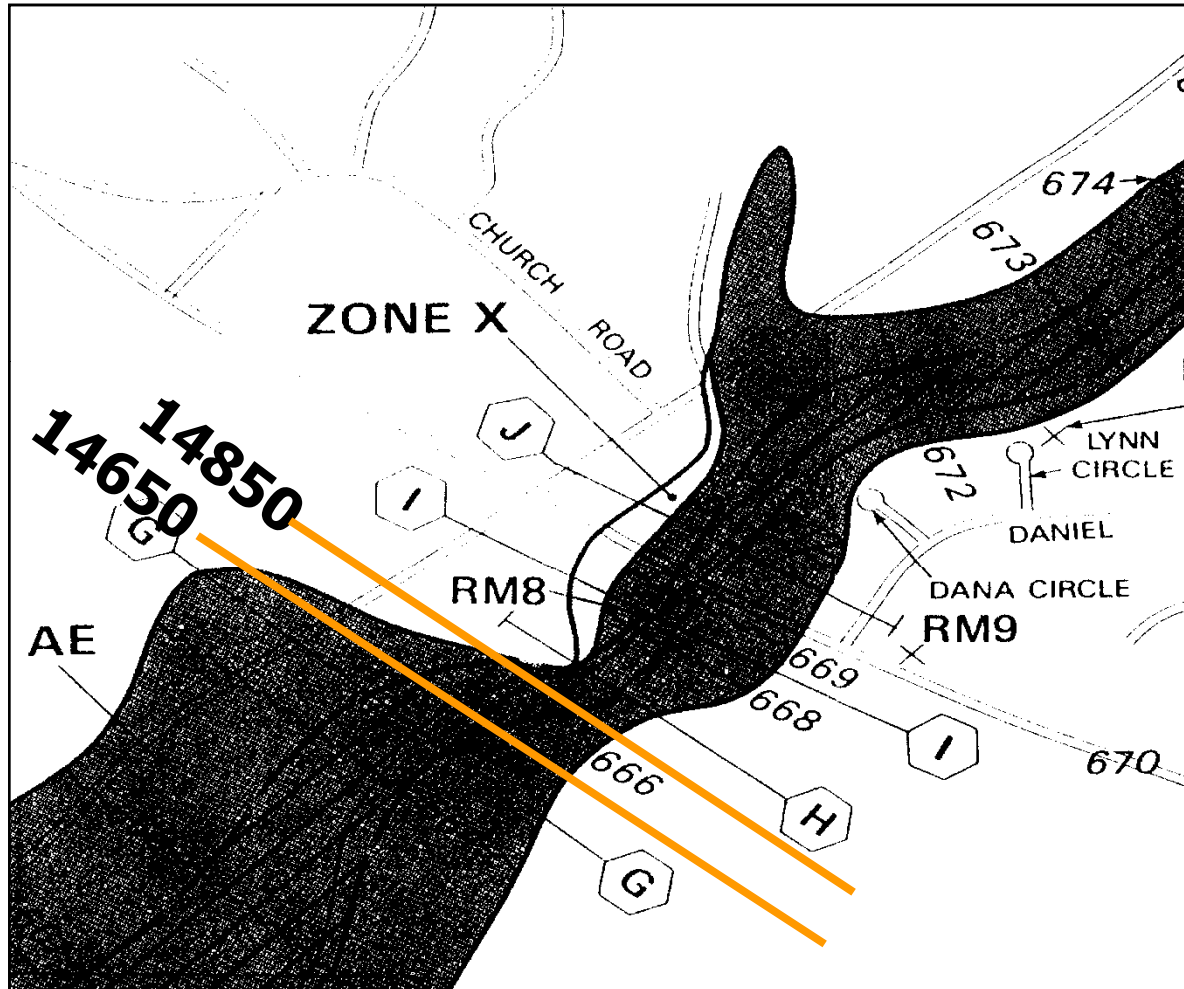
# Proposed Project

- **Proposed road in the floodway and floodplain**
- **Cut and fill along a river**





# Effective FIRM

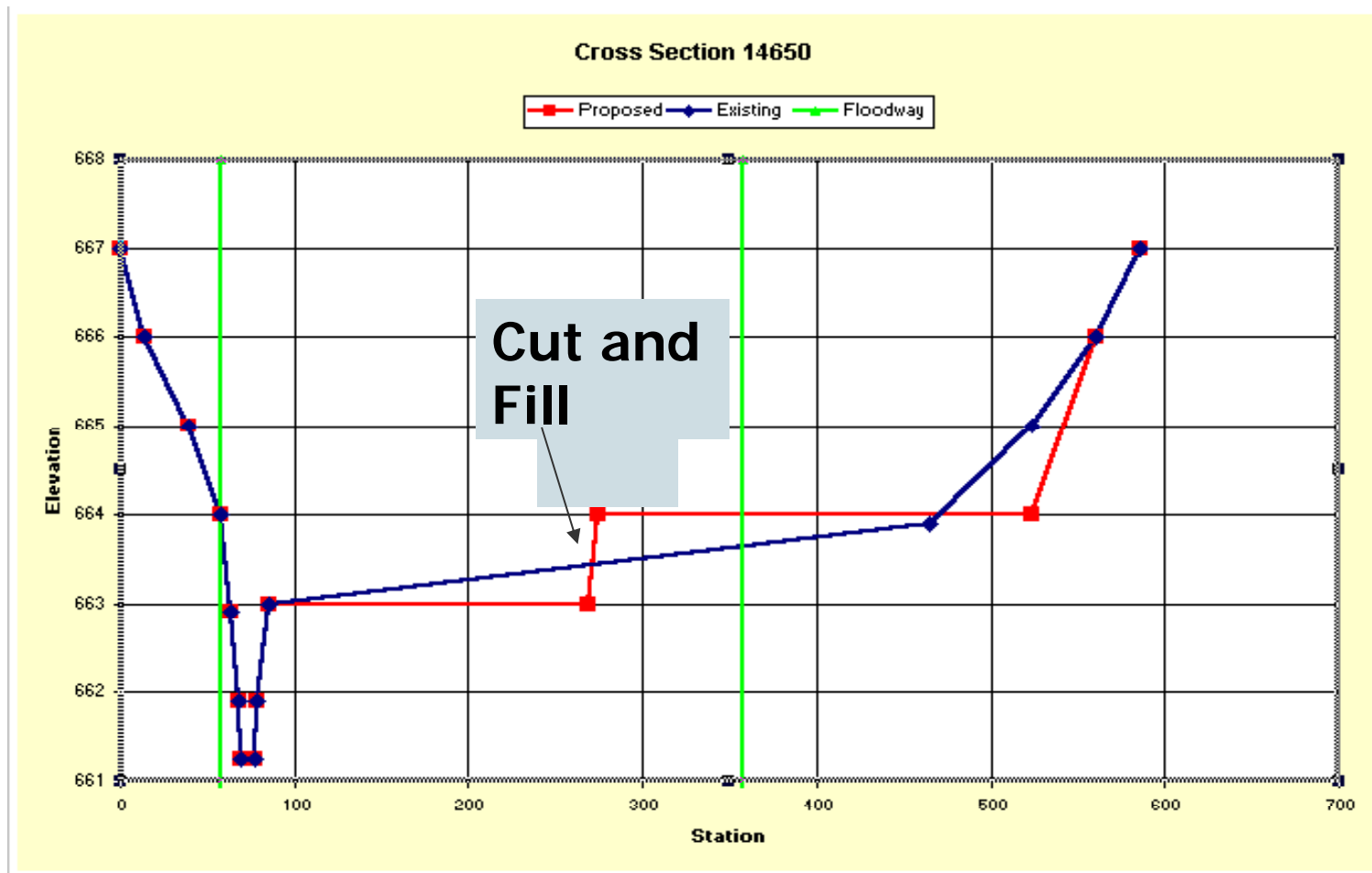


Two New Cross Sections Between G and H

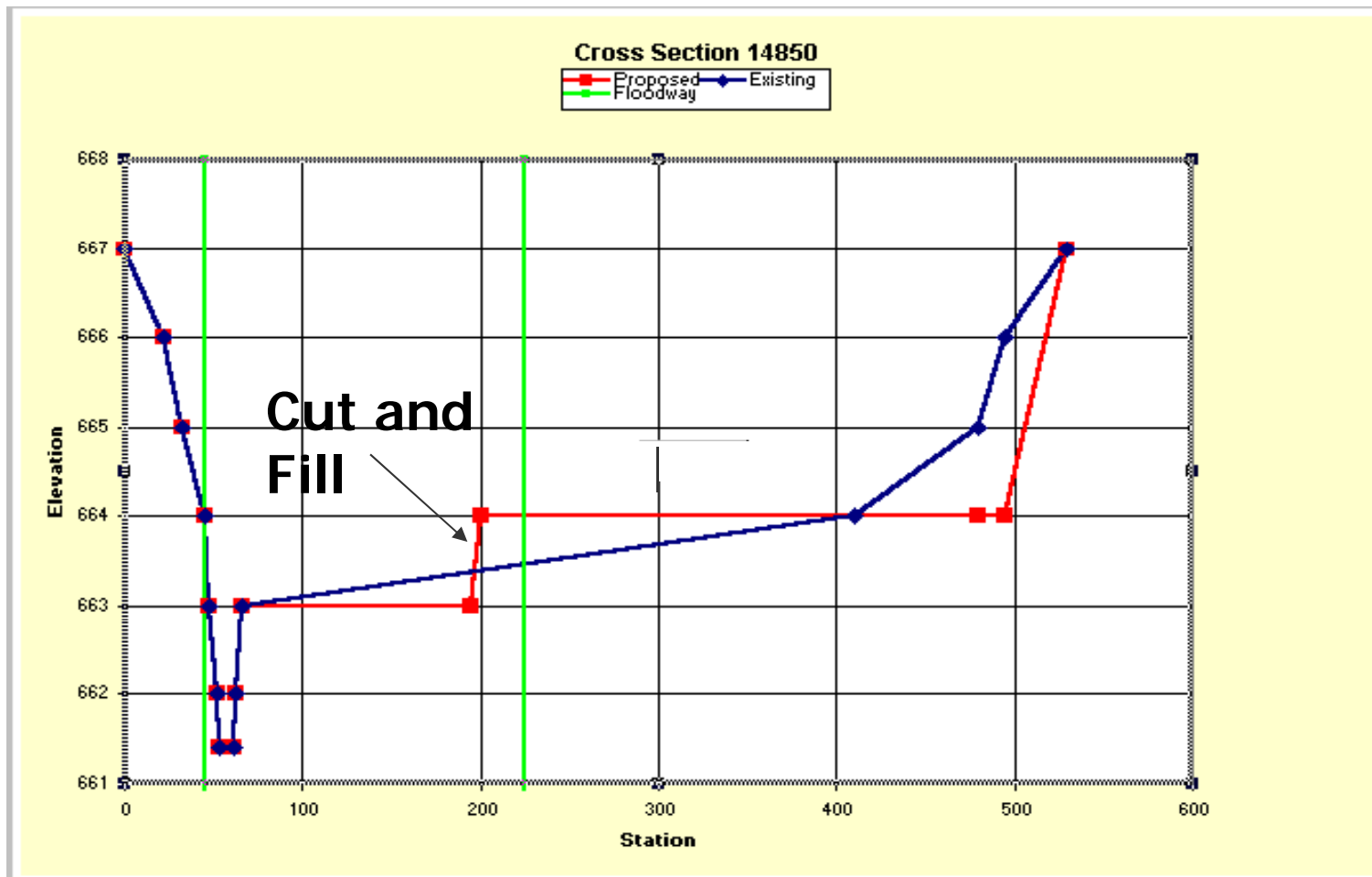
# Cross Sections 14650 and 14850

- **Added to the effective model to create pre-project conditions model**
- **Modified in the pre-project conditions model to reflect the proposed project cut and fill conditions**

# Cross Section 14650



# Cross Section 14850



# Effective Conditions HEC-2 Input- found in warehouse

CITY OF MOODY, ALABAMA EXISTING FIS MARION ENGINEERING CO., INC.  
 I1 MOODY, AL 126P  
 I2 FLOODWAY NATURAL CONDITIONS 100-YEAR  
 I3 LITTLE CANAHA RIVER

J1	ICHECK	IND	NDIV	IDR	STRT	METRIC	HVDMS	Q	WSEL	PQ
	0	2	0	0	0	0	0	0	660.05	0
J2	WPROP	IFLOT	PREVS	XSECV	XSECH	FM	ALLDC	IBW	CHWDG	ITRACE
	1	0	-1							
J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
	110	115	200							
MC	.085	.085	.045							
QT	2	1570	1570							
BT			4.1	562.5	1039					
X1	12160	26	583	595	790	790	790	0	0	0
QR	672.3	0	668	50	664	86	659.5	146	657.8	250
QR	658.4	335	657.8	438	657.9	506	658.3	583	655.4	587
QR	654.8	590.5	655.4	594	657	595	657	636	656.4	650
QR	656.5	675	657.6	739	657.3	847	657.4	926	657.5	1000
QR	658.1	1082	658.3	1131	658.2	1214	657.9	1336	658.7	1446
QR	662	1486								
BT			4.1	583	935.5					
X1	13030	26	583	595	880	880	870	0	0	0
QR	674.2	0	669.9	50	665.9	86	661.4	146	659.7	250
QR	660.3	335	659.7	438	659.8	506	660.2	583	657.3	587
QR	656.7	590.5	657.3	594	658.9	595	658.9	636	658.3	650
QR	658.4	675	659.5	739	659.2	847	659.3	926	659.4	1000
QR	660	1082	660.2	1131	660.1	1214	659.8	1336	660.6	1446
QR	663.9	1486								



# Effective Conditions

## Effective Conditions

ET		4.1	583	878						ET
X1 14525	26	583	595	740	740	735	0	0		OX1
GR 677.8	0	673.5	50	669.5	86	665	146	663.3		250GR
GR 663.9	335	663.3	438	663.4	506	663.8	583	660.9		587GR
GR 660.3	590.5	660.9	594	662.5	595	662.5	636	661.9		650GR
GR 662	675	663.1	739	662.8	847	662.9	926	663		1000GR
GR 663.6	1082	663.8	1131	663.7	1214	663.4	1336	664.2		1446GR
GR 667.5	1486									GR

G

ET		4.1	590	736						ET
X1 15075	25	693	736	560	560	550	0	0		OX1
GR 679.7	0	677.8	75	676.4	150	675	170	672.9		178GR
GR 670.4	234	667.8	310	668.4	359	669.4	485	666.9		510GR
GR 665.8	582	665.8	693	662.3	702	662.2	715	661.5		728GR
GR 665.6	736	670.2	743	669.9	1025	669.2	1250	670.5		1450GR
GR 670.8	1600	671.2	1715	670	1900	672.8	1950	673.7		1960GR

H



### Pre-Project Conditions

Cross Sections 14650 and 14850 added between cross sections 14525 and 15075

ET		4.1	57.25	357.25						
X1 14650	14	57.25	85.75	125	125	125				
GR 667	0	666	14	665	39	664	57.25	662.9	64	
GR 661.9	68	661.26	69	661.26	77	661.9	78	663	85.75	
GR 663.9	465	665	523	666	560	667	586			
ET		4.1	45	255						
X1 14850	14	45	66	200	200	200				
GR 667	0	666	22	665	33	664	45	663	48	
GR 662	52	661.4	53	661.4	61	662	62	663	66	
GR 664	410	665	480	666	495	667	529			
ET		4.1	590	736						ET
X1 15075	25	693	736	225	225	225	0	0		OX1



# Post-Project GR Data

## Post-Project Conditions

Cross Sections 14650 and 14850 modified to reflect cut and fill

ET			4.1	57.25	357.25					
X1	<b>14650</b>	15	57.25	85.75	125	<u>125</u>	<u>125</u>			
GR	667	0	666	14	665	39	664	57.25	662.9	64
GR	661.9	68	661.26	69	661.26	77	661.9	78	663	85.75
<b>GR</b>	<b>663</b>	<b>269</b>	<b>664</b>	<b>274</b>	<b>664</b>	<b>523</b>	<b>666</b>	<b>560</b>	<b>667</b>	<b>586</b>
ET			4.1	45	255					
X1	<b>14850</b>	15	45	66	200	<u>200</u>	<u>200</u>			
GR	667	0	666	22	665	33	664	45	663	48
GR	662	52	661.4	53	661.4	61	662	62	663	66
<b>GR</b>	<b>663</b>	<b>195</b>	<b>664</b>	<b>200</b>	<b>664</b>	<b>480</b>	<b>664</b>	<b>495</b>	<b>667</b>	<b>529</b>





# What to Look For . . .

- **Water-surface elevation increases**
- **Floodway elevation increases**
- **Floodway width increases**
- **Surcharges that exceed 1.0**
- **Negative surcharges**
- **Changes to Manning's "n" values**
- **Reach lengths**

# Pre-Project Conditions Output

## Pre-Project Conditions

LITTLE CAHABA RIVER

SUMMARY PRINTOUT TABLE 110

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STEMCL	STCHL	STCHR	STEMCR
* 13790.000	663.26	.00	663.27	1313.85	358.03	83.35	1128.62	.00	.00	583.00	595.00	.00
13790.000	663.36	.10	663.41	389.00	.00	151.94	1418.06	389.00	583.00	<u>583.00</u>	595.00	972.00
* 14525.000	664.18	.00	664.24	1247.40	216.82	153.91	1199.28	.00	.00	583.00	595.00	.00
14525.000	665.22	1.04	665.30	295.00	.00	191.13	1378.86	295.00	583.00	<u>583.00</u>	595.00	878.00
14650.000	664.88	.00	665.06	475.68	6.66	420.92	1142.42	.00	.00	57.25	85.75	.00
14650.000	665.63	.74	665.74	300.00	.00	408.38	1161.62	300.00	57.25	<u>57.25</u>	85.75	357.25
* 14850.000	665.81	.00	665.87	467.98	17.48	285.06	1267.45	.00	.00	45.00	66.00	.00
14850.000	666.31	.50	666.43	210.00	.00	387.51	1182.49	210.00	45.00	<u>45.00</u>	66.00	255.00
* 15075.000	666.66	.00	667.60	211.57	179.38	1389.73	.89	.00	.00	693.00	726.00	.00
* 15075.000	666.68	.03	667.66	146.00	154.62	1415.38	.00	146.00	590.00	693.00	726.00	<u>726.00</u>
* 15300.000	668.40	.00	668.53	459.21	799.96	667.69	2.35	.00	.00	573.00	610.00	.00
* 15300.000	668.76	.35	669.22	90.50	357.45	1112.55	.00	90.50	519.50	573.00	610.00	<u>610.00</u>

# Post-Project Conditions Output

## Post Project Conditions

LITTLE CAHABA RIVER

SUMMARY PRINTOUT TABLE 110

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
* 13790.000	663.26	.00	663.27	1313.85	358.03	83.35	1128.62	.00	.00	583.00	595.00	.00
13790.000	663.26	.10	663.41	389.00	.00	151.94	1418.06	389.00	583.00	583.00	595.00	972.00
* 14525.000	664.18	.00	664.24	1247.40	216.82	153.91	1199.28	.00	.00	583.00	595.00	.00
14525.000	665.22	1.04	665.30	295.00	.00	191.13	1378.86	295.00	583.00	583.00	595.00	878.00
14650.000	664.87	.00	665.04	498.11	6.40	406.82	1156.78	.00	.00	57.25	85.75	.00
14650.000	665.62	.75	665.73	300.00	.00	399.89	1170.11	300.00	57.25	57.25	85.75	357.25
* 14850.000	665.77	.00	665.83	490.49	16.52	280.40	1273.08	.00	.00	45.00	66.00	.00
14850.000	666.29	.52	666.42	210.00	.00	388.15	1181.85	210.00	45.00	45.00	66.00	255.00
* 15075.000	666.64	.00	667.60	210.77	176.17	1392.96	.87	.00	.00	693.00	736.00	.00
* 15075.000	666.68	.03	667.66	146.00	153.80	1416.20	.00	146.00	590.00	693.00	736.00	736.00
* 15200.000	668.40	.00	668.53	460.53	800.38	667.19	2.42	.00	.00	573.00	610.00	.00
* 15200.000	668.76	.35	669.22	90.50	357.58	1112.42	.00	90.50	519.50	573.00	610.00	610.00



# Pre-Project Conditions Output

## Pre-Project Conditions

Summary Output Table 115

Section Number	Elevation Increase	Top Width	Left Encroach Station	Left Sta Distance From Center	Center Station	Right Sta Distance From Center	Right Encroach Station
13790.000	.10	389.00	583.00	6.00	589.00	383.00	972.00
14525.000	1.04	295.00	583.00	6.00	589.00	289.00	878.00
<b>14650.000</b>	<b>.74</b>	<b>300.00</b>	<b>57.25</b>	<b>14.25</b>	<b>71.50</b>	<b>285.75</b>	<b>357.25</b>
<b>14850.000</b>	<b>.50</b>	<b>210.00</b>	<b>45.00</b>	<b>10.50</b>	<b>55.50</b>	<b>199.50</b>	<b>255.00</b>
15075.000	.03	146.00	590.00	124.50	714.50	21.50	736.00
15300.000	.35	90.50	519.50	72.00	591.50	18.50	610.00



# Output Table 200

## Pre-Project Conditions

FLOODWAY DATA, LITTLE CAHABA RIVER  
Summary Output Table 200

STATION	----- WIDTH	FLOODWAY SECTION AREA	----- MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
13790.000	389.	1008.	1.6	663.4	663.3	.1
14525.000	295.	775.	2.0	665.2	664.2	1.0
14650.000	300.	721.	2.2	665.6	664.9	.7
14850.000	210.	661.	2.4	666.3	665.8	.5
15075.000	146.	261.	6.0	666.7	666.7	.0
15300.000	90.	334.	4.4	668.8	668.4	.4



# Three (3) Computer Runs

- **Effective**
- **Pre-Project**
- **Post Project**

# Output Comparison

100-Year Water Surface Elevation			
Cross Section	Effective	Pre-Project	Post Project
13790	663.26	663.26	663.26
14525	664.18	664.18	664.18
<b>14650</b>		<b>664.88</b>	<b>664.87</b>
<b>14850</b>		<b>665.81</b>	<b>665.77</b>
15075	666.98	666.66	666.64
15300	668.35	668.40	668.40



# Output Comparison

Floodway Widths			
Cross Section	Effective	Pre-Project	Post Project
13790	389	389	389
14525	295	295	295
<b>14650</b>		<b>300</b>	<b>300</b>
<b>14850</b>		<b>210</b>	<b>210</b>
15075	146	146	146
15300	90	90	90





# Common Problems

- **Changes in Manning's "n" values**
- **Changes to the floodway**
- **Surcharge values outside 0.0 to 1.0**
- **Incorrect reach lengths**

# No-Impact

- **Project cause increases in**
  - flood levels
  - floodway velocities
  - floodway widths
- **Not a “No-Rise” and**
- **Must meet Section 65.12 (CLOMR)**

# No-Impact Hydraulic Modeling

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**Questions?**



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**Risk MAP**