

THE TRANSITORY ISLAND OF OTTAWA



IAFSM 2019 ANNUAL CONFERENCE



March 14, 2018

KNIGHT

Engineers & Architects

THE TRANSITORY ISLAND OF OTTAWA

OTTAWA, ILLINOIS



- **ONLY RATED CLASS 2 CRS COMMUNITY IN ILLINOIS AND REGION 5 !!**
- **ONLY ONE OTHER COMMUNITY HAS HIGHER RATING**
- **CONGRATS - OUTSTANDING FLOODPLAIN MANAGEMENT PROGRAM**

Bryan Martindale, P.E. CFM

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OVERVIEW

ARE YOU IN THE RIGHT SESSION?

FREQUENT FLOODS “CUT-OFF” PORTION OF OTTAWAAKA “EASTSIDE”

“CUT-OFF” = LOSS OF ACCESS = DAMAGES

FIX IS EXPENSIVE!

FUNDING FOR FIX  PDM GRANT

PDM GRANT PROCESS - NORTH CENTRAL ILLINOIS COUNCIL OF GOVERNMENTS

BENEFIT COST ANALYSIS VIA FEMA’S BCA TOOL

CHALLENGES!

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- PROJECT LOCATION
- PRE-MITIGATION CONDITIONS
“FLOODING & DAMAGES”
- POTENTIAL MITIGATION
“COSTS”
- BCA TOOL MODELING
- BC RESULTS



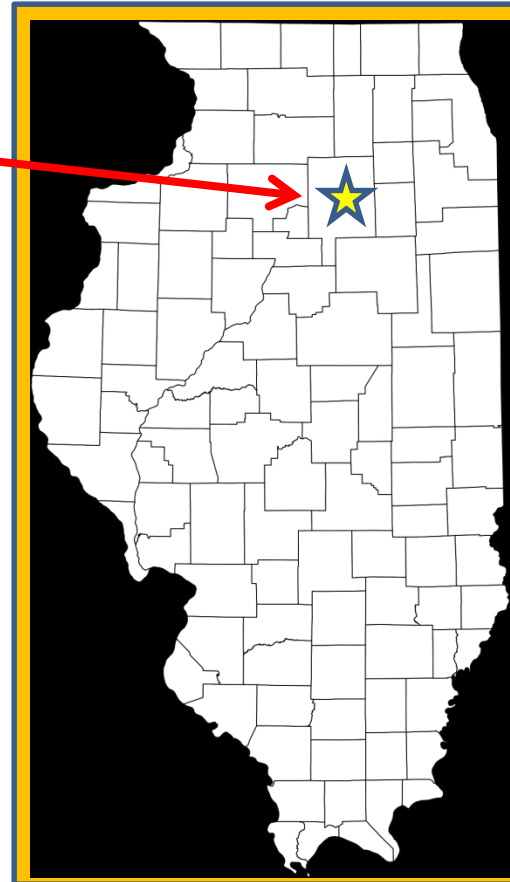
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PROJECT LOCATION

OTTAWA, ILLINOIS

LOCATED IN LASALLE COUNTY



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PROJECT LOCATION

OTTAWA, ILLINOIS



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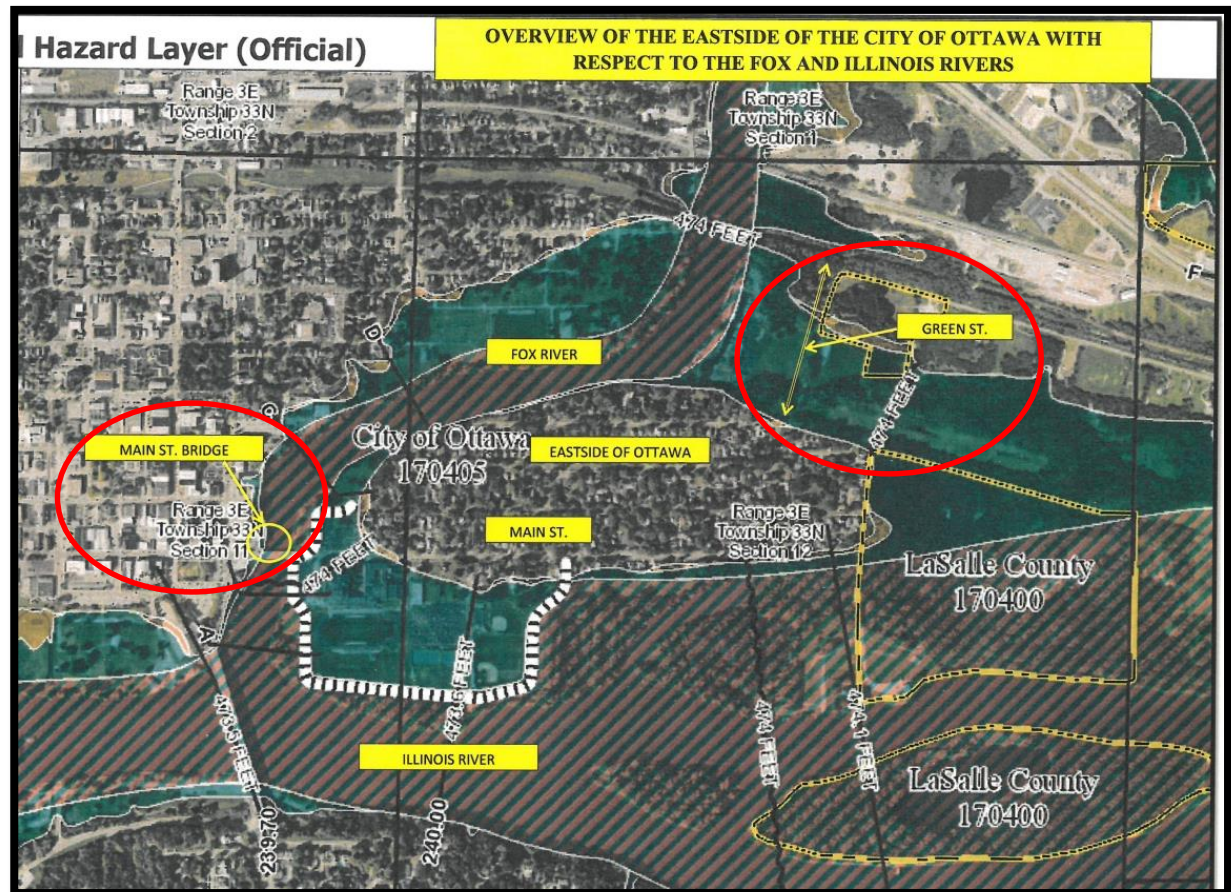


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EASTSIDE OF OTTAWA

EFFECTIVE FIRM
MAY 19, 2014



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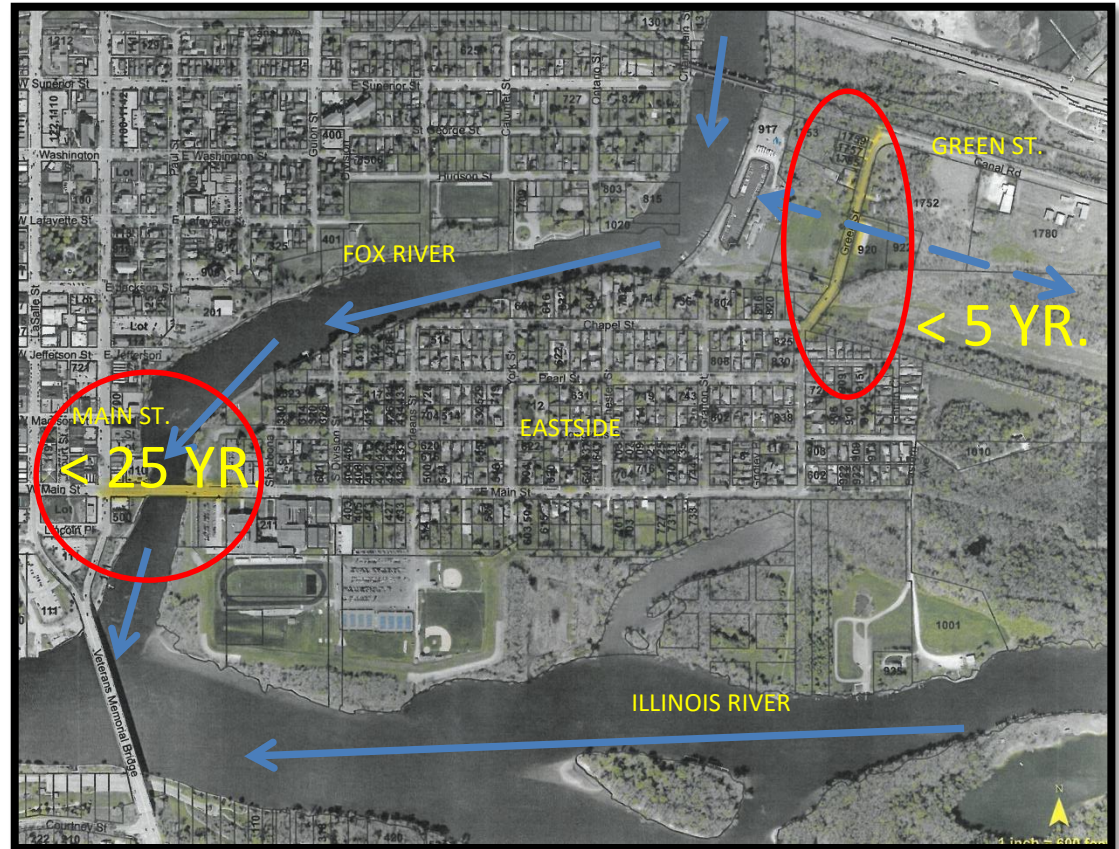
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PRE-MITIGATION CONDITIONS FLOODING

TWO ACCESS POINTS

NOT IMPACTED AT THE
SAME FREQUENCY

CAUSES MODELING ISSUES
– DISCUSSED LATER

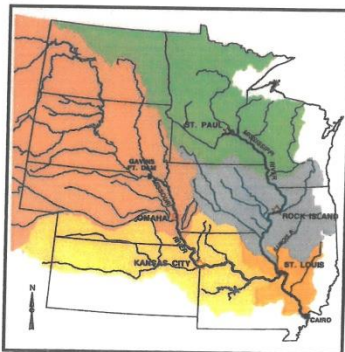


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PRE-MITIGATION CONDITIONS FLOODING

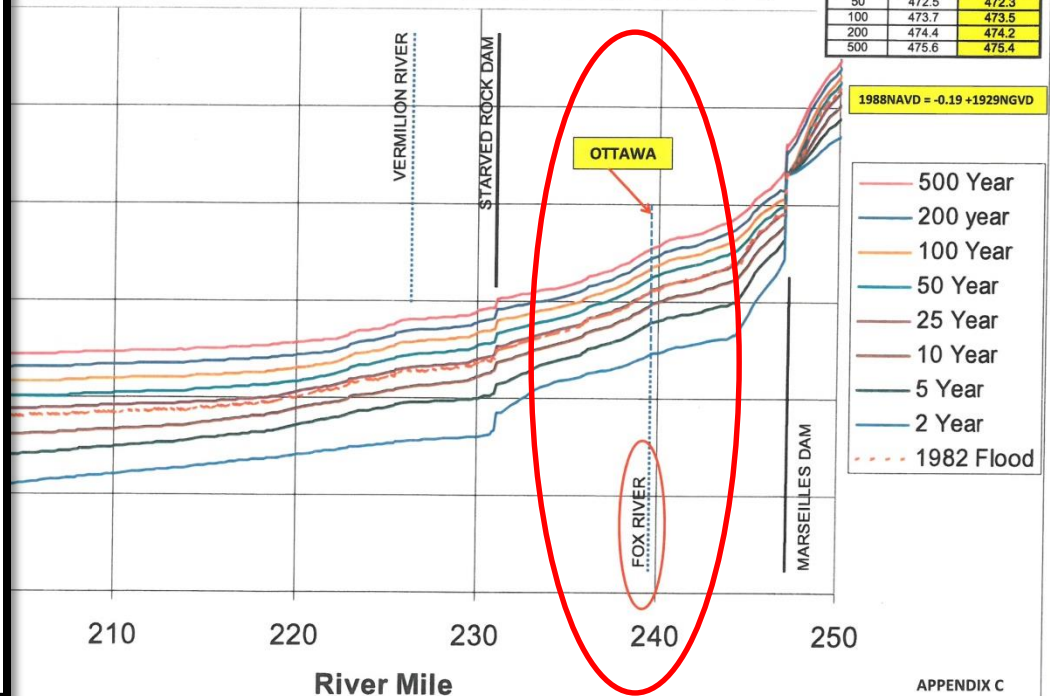
Upper Mississippi River System Flow Frequency Study



Final Report

January 2004

U.S. ARMY CORPS OF ENGINEERS UPPER MISSISSIPPI RIVER SYSTEM FLOW FREQUENCY STUDY ILLINOIS RIVER STAGE FREQUENCY PROFILES



APPENDIX C
PLATE C-I-14

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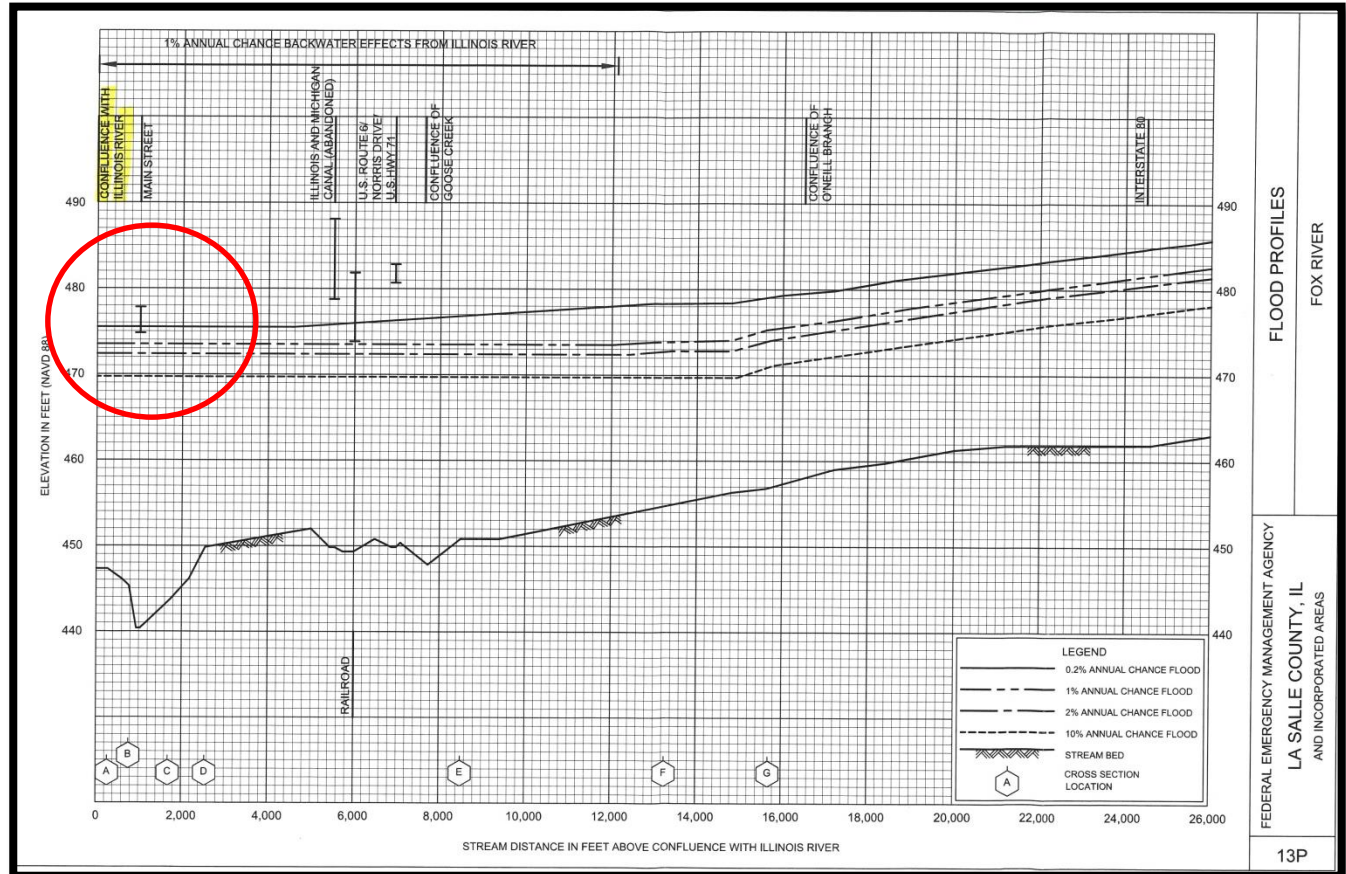
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PRE-MITIGATION CONDITIONS FLOODING

EFFECTIVE FIS

100-YEAR =
473.5 NAVD

PROBLEMS
BEGIN AT 467.0
< 5 YEAR EVENT



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QUANTIFY FLOOD DAMAGES

STRUCTURES, CONTENTS,
VEHICLES....STUFF

ELIMINATION OF FLOOD
DAMAGES....

PROVIDES BENEFITS!

BUT.....



PRE-MITIGATION CONDITIONS DAMAGES

REAL AND ATYPICAL FLOOD DAMAGES

LOSS OF ACCESS....FOR
DAYS!!

300 RESIDENTS,
BUSINESSES AND THE
HIGH SCHOOL

GAGE DATA &
CITY RECORDS

16 EVENTS SINCE 1985

Flood Event	Peak Flood Elevation	Flood Dates	Main Street Closes @ elevation 470.0		Green Street Closes @ elevation 467.0	
			Closed	Duration of closure	Closed	Duration of closure (days)
1	468.2	November 1985	NO	0	YES	2
2	468.4	November 1990	NO	0	YES	1
3	468.0	May 12-14, 2002	NO	0	YES	3
4	467.8	December 11-13, 2005	NO	0	YES	3
5	467.6	January 8-10, 2008	NO	0	YES	3
6	468.9	December 28 -31, 2008	NO	0	YES	4
7	467.5	May 2009	NO	0	YES	1
8	467.9	June 16-19, 2015	NO	0	YES	4
9	468.1	December 29-31, 2015	NO	0	YES	3
10	466.5	May 2, 2017	NO	0	YES	1

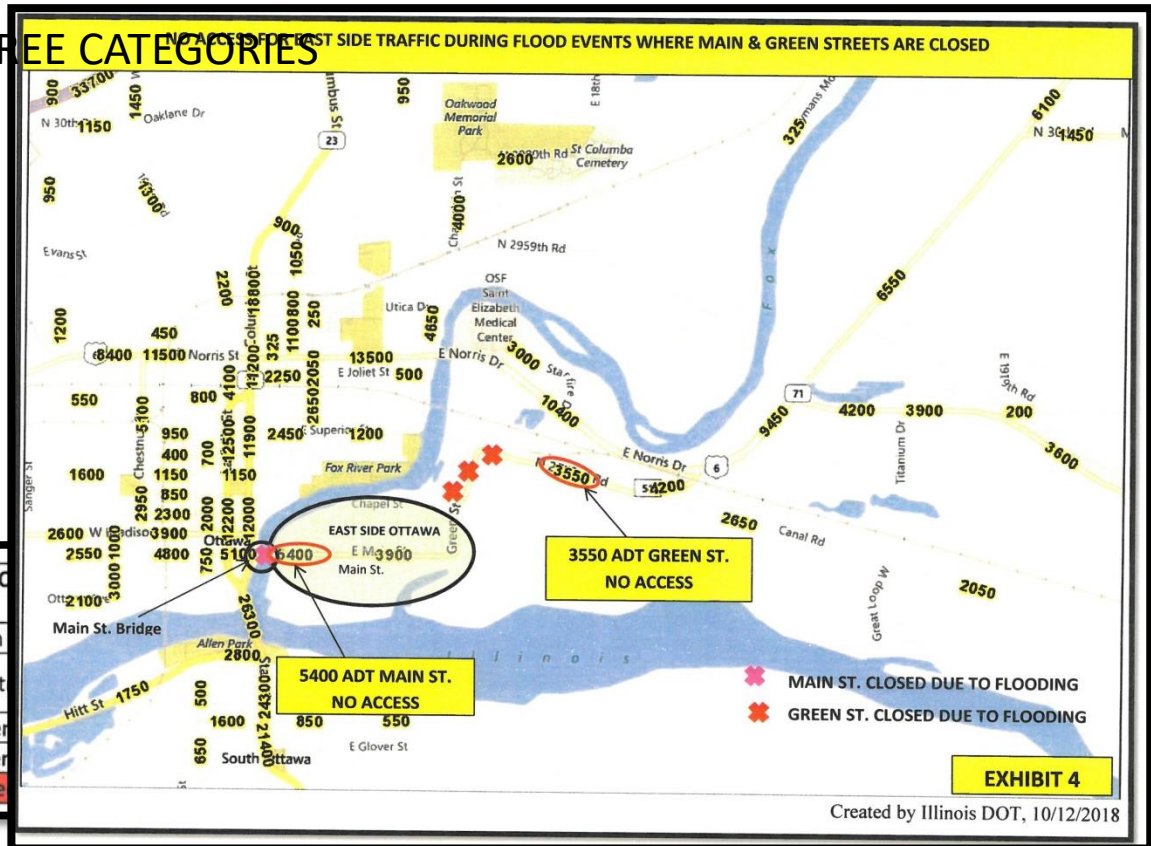
QUANTIFY DAMAGES – THREE CATEGORIES

CATEGORY 1: LOSS OF ACCESS VIA ROAD CLOSURES

8950 TRIPS/DAY
ELIMINATED !

CLOSURE PLAN FOR GREEN AND MAIN STREETS/ SCHOOL

Flood Elevation	Current Configuration	
	Green Street	Main St
< 467.0	Open	Open
467.0 to 470.0	Closed	Open
> 470.0	Closed	Closed



PRE-MITIGATION CONDITIONS DAMAGES

QUANTIFY DAMAGES

CATEGORY 2:

LOSS OF ACCESS

FOR MEDICAL EMERGENCY, FIRE, PUBLIC
SERVICES, ETC.



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QUANTIFY DAMAGES

CATEGORY 3:

SOCIAL IMPACTS

8950 TRIPS ELIMINATED
MENTAL STRESS AND ANXIETY
LOST PRODUCTIVITY

HIGH SCHOOL

\$22 MILLION ANNUAL BUDGET
1400 STUDENTS
90 FACULTY



QUANTIFY DAMAGES

BCA TOOL PROBLEMS

CATEGORY 1 - ELIMINATION OF TRIPS



CATEGORY 2 - EMERGENCIES WHILE ACCESS LOST



CATEGORY 3 – SOCIAL IMPACTS



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POTENTIAL MITIGATION COSTS

OTTAWA TOWNSHIP HIGH SCHOOL LEVEE PROJECT



INDEPENDENT OF **THIS** PDM
PROCESS

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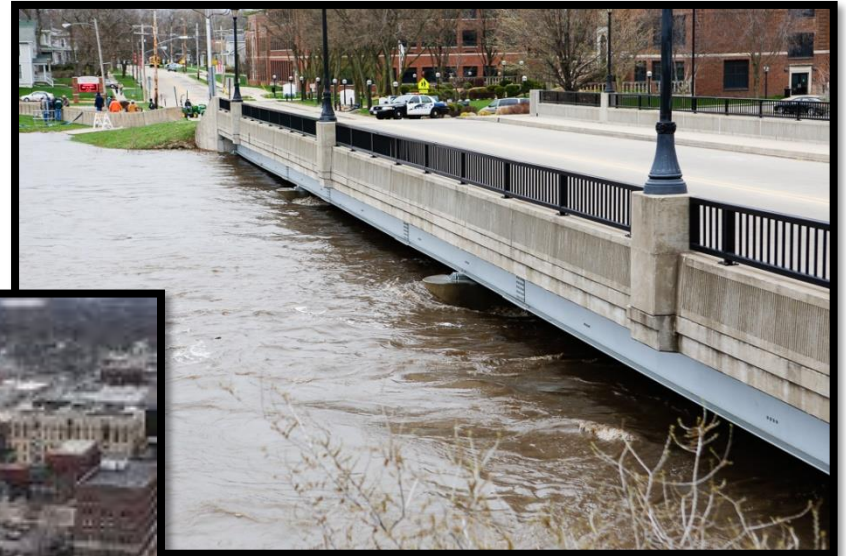
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POTENTIAL MITIGATION COSTS

MAIN STREET BRIDGE

RAISE BRIDGE AND
APPROACHES.....NOT ECONOMICALLY
FEASIBLE



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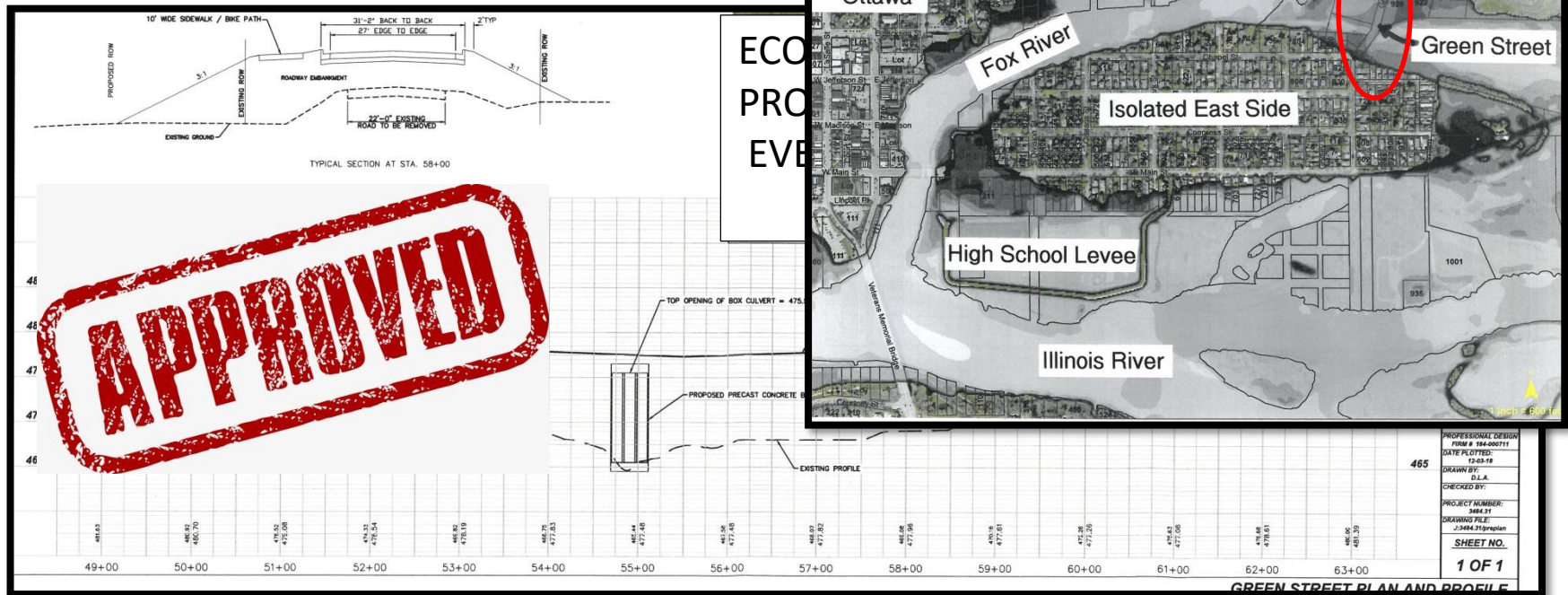
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POTENTIAL MITIGATION COSTS

GREEN STREET



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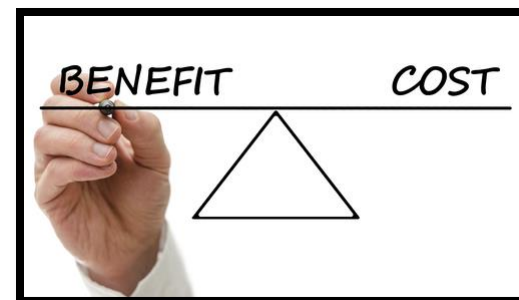
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BENEFIT COST RATIO VIA FEMA BCA TOOL

COST..... OBVIOUS

BENEFIT (ELIMINATION OF DAMAGES)

NOT SO OBVIOUS



RATIO IS MATH; BIGGER IS BETTER!

$$\text{BCR} = \frac{\text{PV}_{\text{benefits}}}{\text{PV}_{\text{costs}}}$$

where:

$\text{PV}_{\text{benefits}}$ = present value of benefits

PV_{costs} = present value of costs

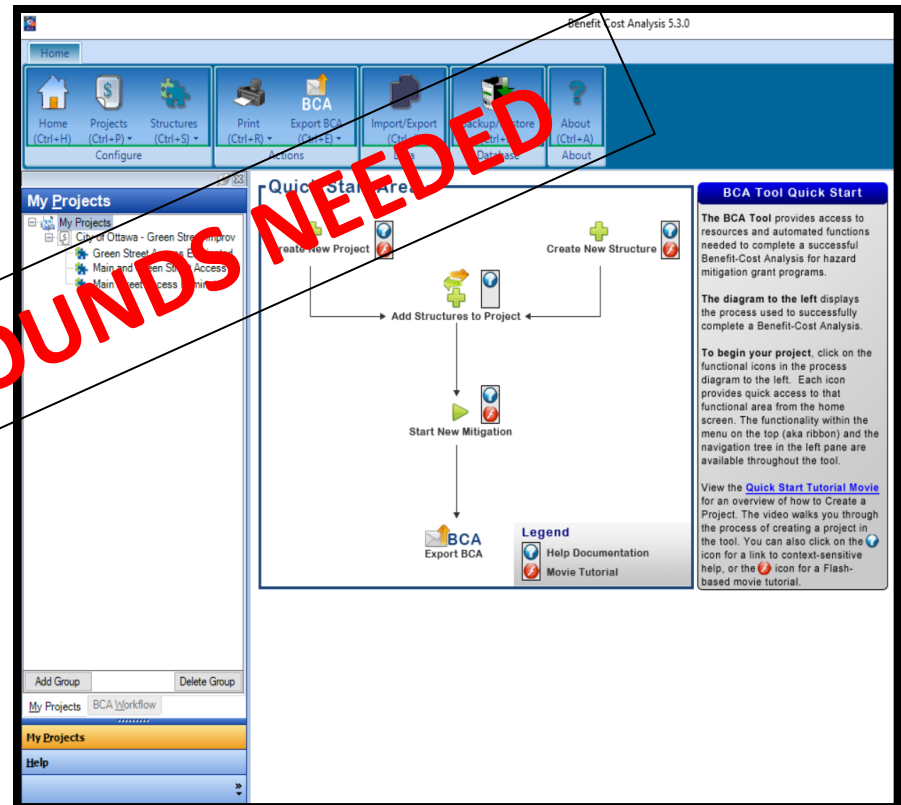
ONE SIZE DOESN'T FIT ALL...

PRE AND POST MITIGATION
CIRCUMSTANCES

UNIQUE CONFIGURATION....

- TWO ACCESSES AT DIFFERENT ELEVATIONS
- POST- MITIGATION DAMAGES NOT ELIMINATED BECAUSE FLOODING STILL ELIMINATES MAIN STREET ACCESS!

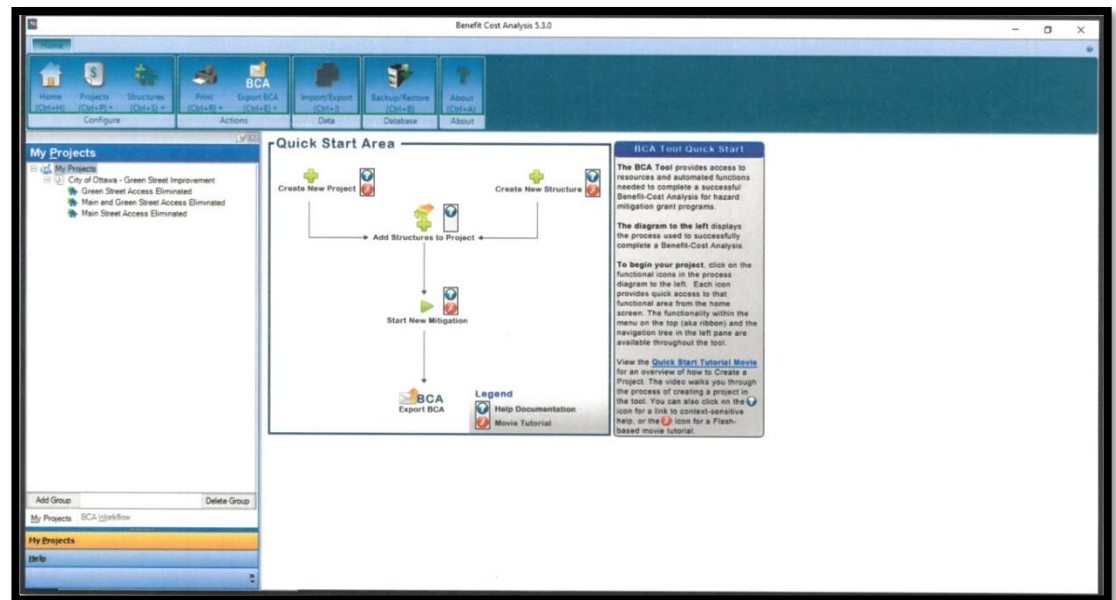
WORK AROUNDS NEEDED



WORK AROUND 1: DAMAGES BI-DIRECTIONAL ACCESS DESTROYED (BAD) APPROACH

BCA APPROACH :
“STRUCTURES” USED TO
ASSESS DAMAGES

BAD APPROACH:
FLOOD CONDITIONS USED
TO ASSESS DAMAGES



WORK AROUND 1: DAMAGES

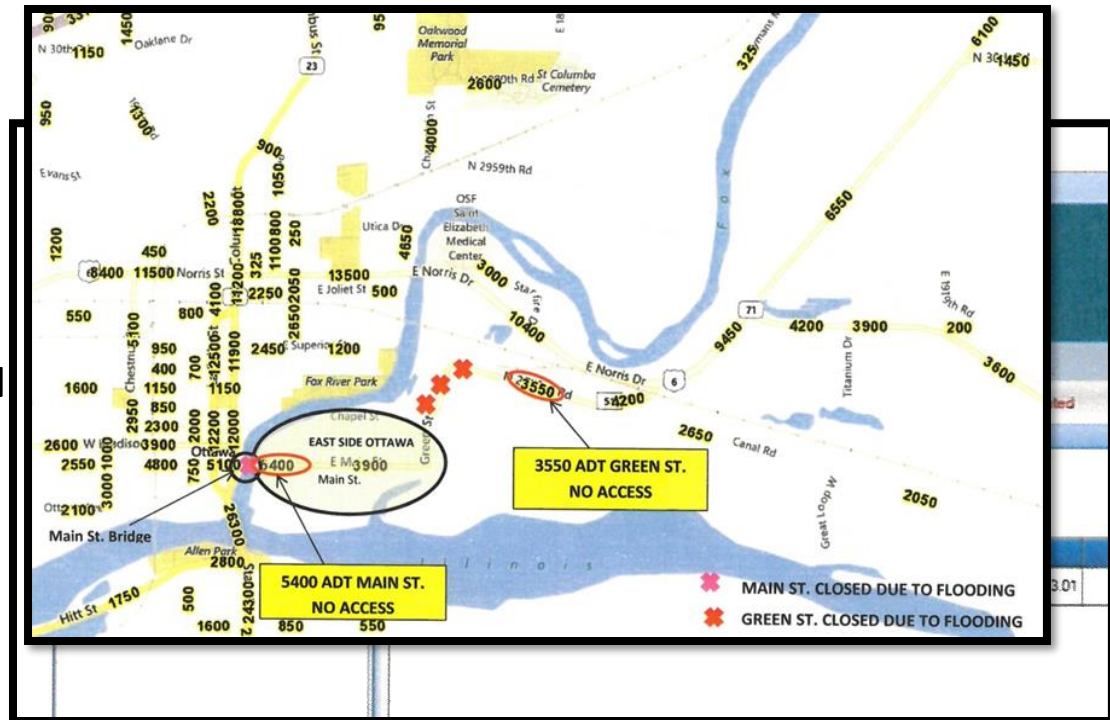
3 FLOOD CONDITION SCENARIOS....

SPECIFIC DAMAGES “ISOLATED”

BC FOR PRE AND POST MITIGATION

LOST ACCESS FOR

- 1 - GREEN ST
2 - GREEN ST AND MAIN ST
3 - MAIN ST (POST MITIGATION)



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WORK AROUND 1: DAMAGES BAD APPROACH

SCENARIO 1

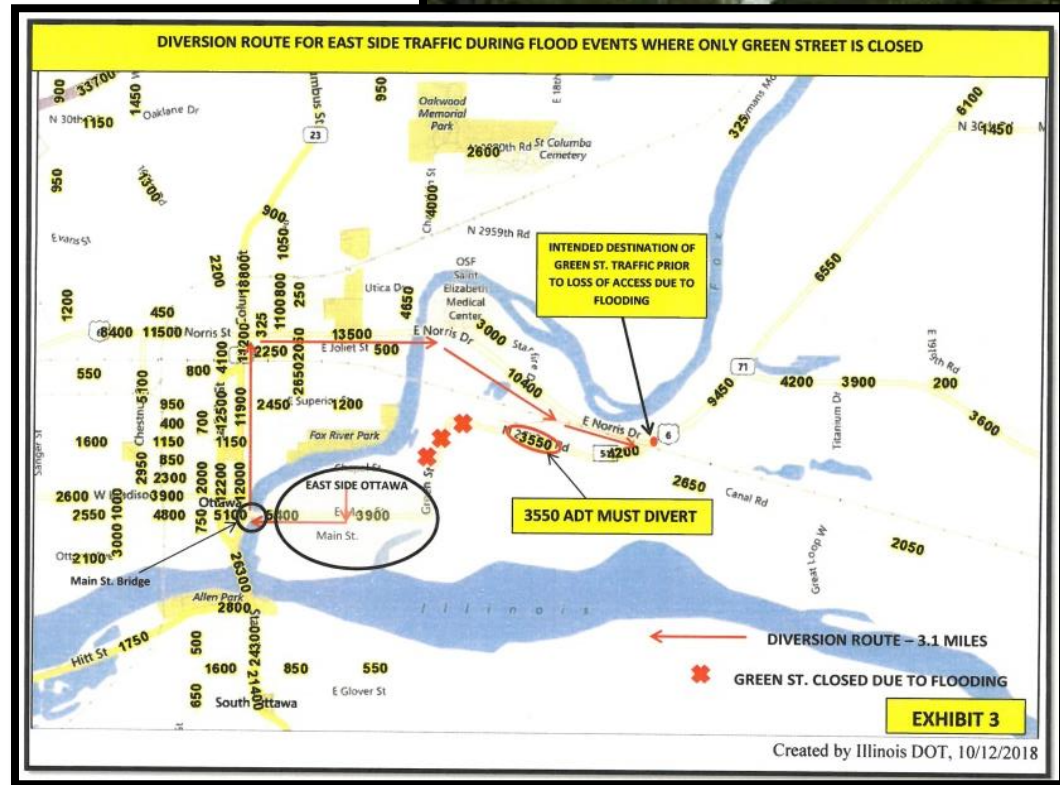
FLOOD ELEVATION > 467.0
LOSS OF ACCESS VIA GREEN

CITY CLOSES GREEN STREET

ACCESS VIA MAIN ONLY

DAMAGES:

- DETOUR VIA MAIN ST.
- HIGH SCHOOL CLOSED



WORK AROUND 1: DAMAGES BAD APPROACH

SCENARIO 2

FLOOD ELEVATION > 470.0

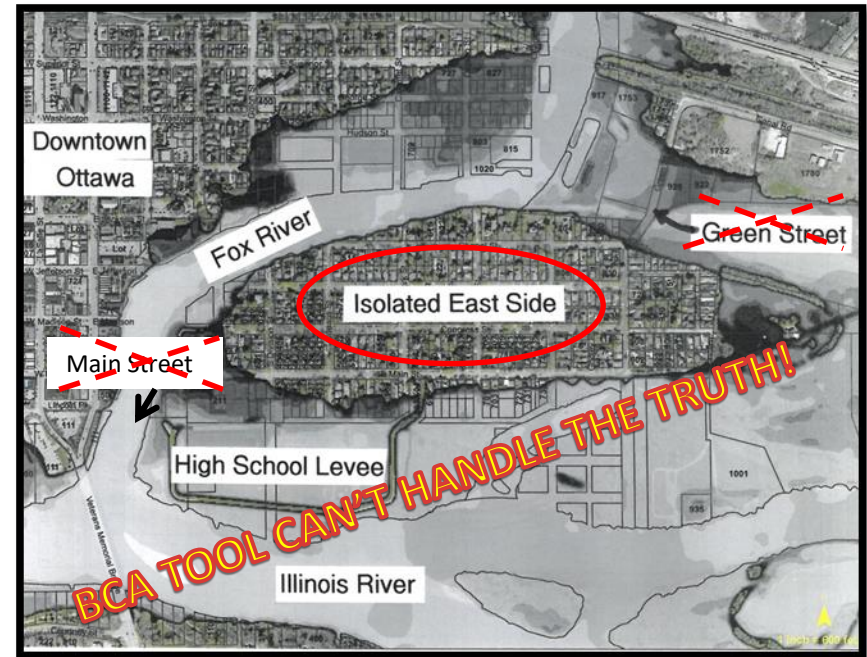
LOSS OF ACCESS VIA GREEN & MAIN STREETS

CITY CLOSES BOTH STREETS

DAMAGES:

NO ACCESS TO EASTSIDE - NO DETOUR.

HIGH SCHOOL CLOSED



TOTAL ISOLATION OF EASTSIDE!

WORK AROUND 1: DAMAGES BAD APPROACH

SCENARIO 3

FLOOD ELEVATION > 470.0

LOSS OF ACCESS VIA MAIN STREET

- RAISED GREEN STREET PROVIDES ACCESS

DAMAGES

DETOUR VIA NEW GREEN STREET

HIGH SCHOOL CLOSED

WHY IS SCENARIO 3 NEEDED?

SCENARIO 2 RESIDUAL (POST
MITIGATION) DAMAGES NEEDED

SCENARIO 3 DATA INPUT AS NEUTRAL;
I.E. BC = 0.0

WORK AROUND 2 : CO\$T\$ HOLISTIC APPROACH

PROJECT INCLUDES
GREEN ST IMPROVEMENTS
NO IMPROVEMENT TO MAIN

BENEFITS: ACCESS PROVIDED BY EACH

ACCESS = TRAFFIC COUNTS

GREEN ST. = ~40%

MAIN ST. = ~60%



DIVISION OF MITIGATION COSTS WERE SPLIT BASED ON TRAFFIC COUNTS

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BASE BCR

- ✓ STANDARD BENEFITS VS. COSTS

FINAL BCR

- ✓ INCLUSIVE OF SOCIAL IMPACTS ~ NEW WAY TO LOOK AT IMPACTS
- ✓ OTTAWA HIGH SCHOOL
- ✓ MENTAL STRESS, ANXIETY AND LOSS OF PRODUCTIVITY
- ✓ 1400 STUDENTS (NOT INCLUDING PARENTS) AND 90 STAFF MEMBERS



THE NUMBERS

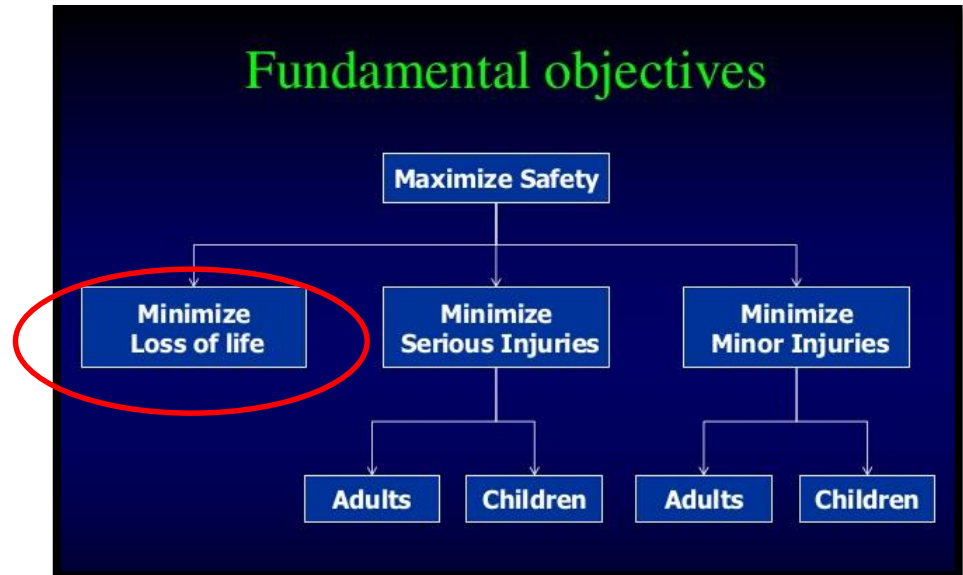
BASE VS. FINAL

	REVISED PROJECTED			
Dec 15 2018	\$	4,570,943.00		
	INCLUDING SOCIAL BENEFITS			
	Benefits	Costs	Individual B/C	Cost Ratios
Green Eliminated	\$ 5,463,502.00	\$ 1,814,664.37	3.01	39.7%
Main & Green Eliminated	\$ 10,875,362.00	\$ 2,756,278.63	3.95	60.3%
Main Eliminated (post mitigation)	\$ -	\$ -		
TOTALS	\$ 16,338,864.00	\$ 4,570,943.00		
OVERALL B/C WITH SOCIAL BENEFITS	3.57			
	ELIMINATED SOCIAL BENEFITS			
Green Eliminated	\$ 1,037,192.00	\$ 1,814,664.37	0.57	39.7%
Main & Green Eliminated	\$ 6,449,052.00	\$ 2,756,278.63	2.34	60.3%
Main Eliminated (post mitigation)				
TOTALS W/O SOCIAL BENEFITS	\$ 7,486,244.00	\$ 4,570,943.00		
OVERALL B/C W/O SOCIAL BENEFITS	1.64			

UNADDRESSED ISSUE

LOSS OF LIFE

- NO METHOD TO INCLUDE
- ASSIGNING VALUE
- IMPACT TO BCR VALUE



“GOOD NUMBERS”

NORTH CENTRAL ILLINOIS
COUNCIL OF
GOVERNMENTS

WE HAVE A CHANCE FOR
THE \$\$\$\$\$!

DISCUSSION ?

