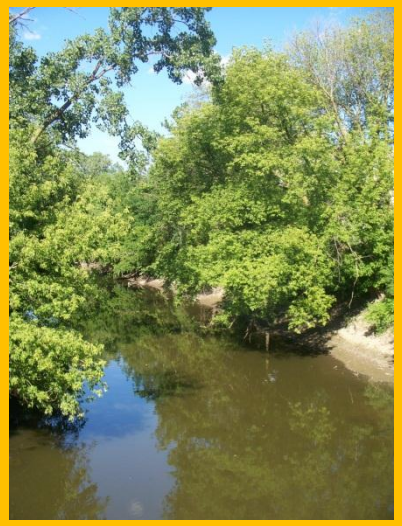
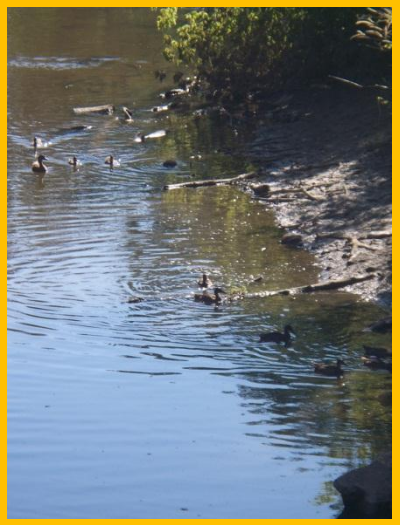
A Multifaceted Urban Stream Restoration Project for the Ottawa River at the University of Toledo



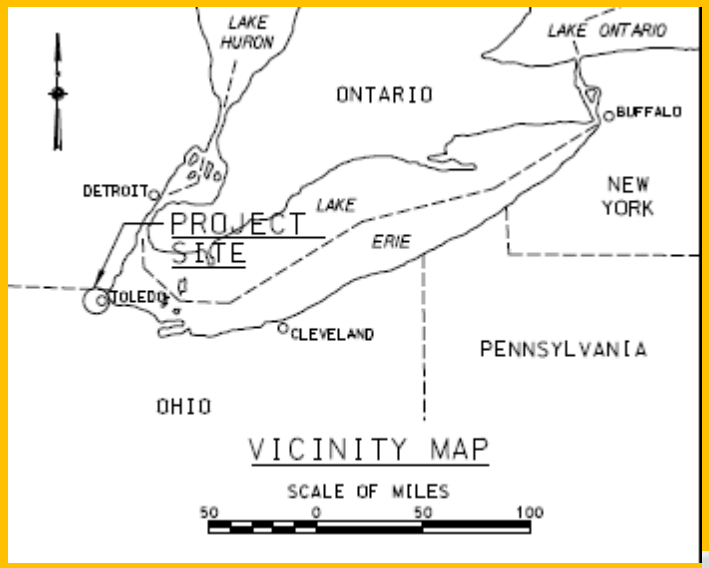


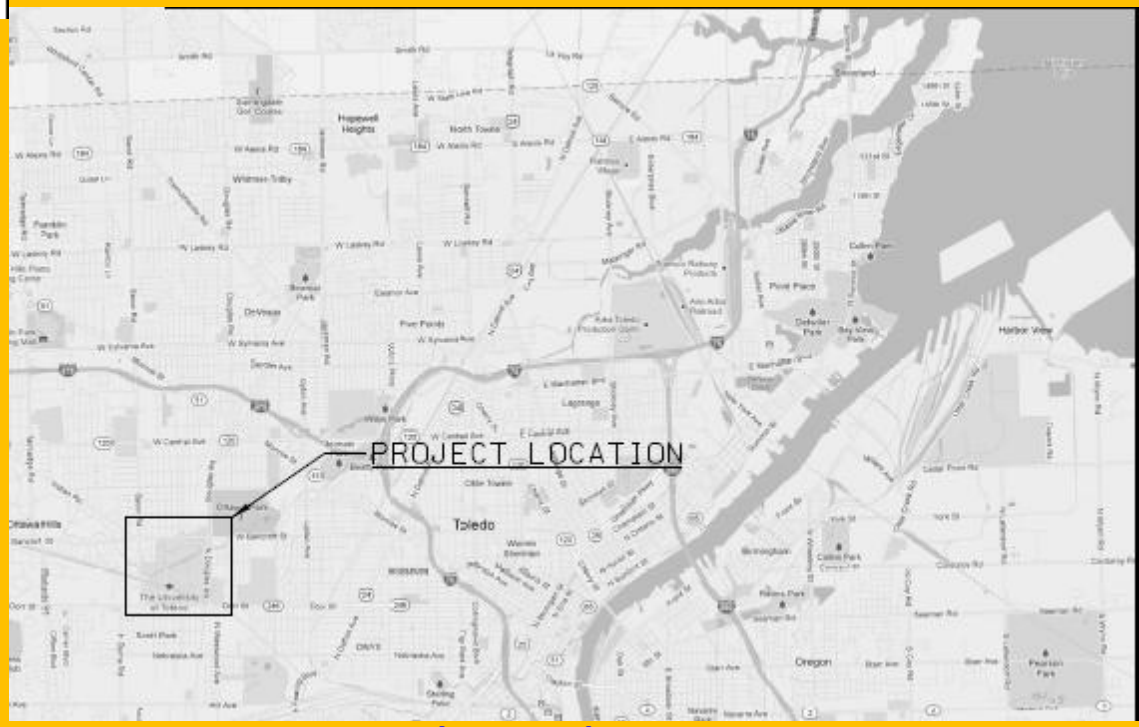
Presidents Commission on the River

Chair: Dr. Patrick Lawrence

patrick.lawrence@utoledo.edu

UPDATE October 2012



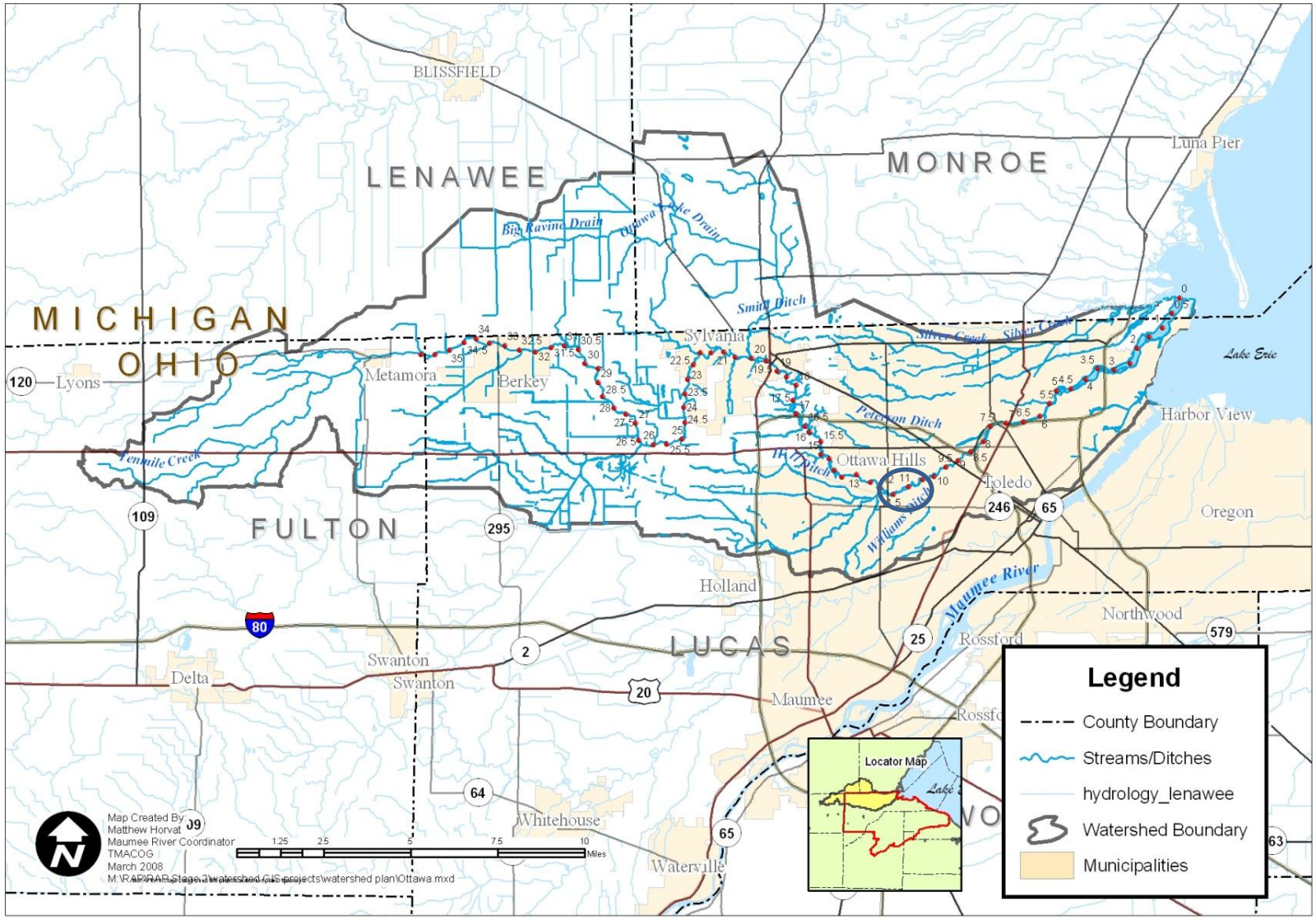


UT Tenmile Creek/Ottawa River Project Site (Region)

Figure 1

Ottawa River/Ten Mile Creek Watershed

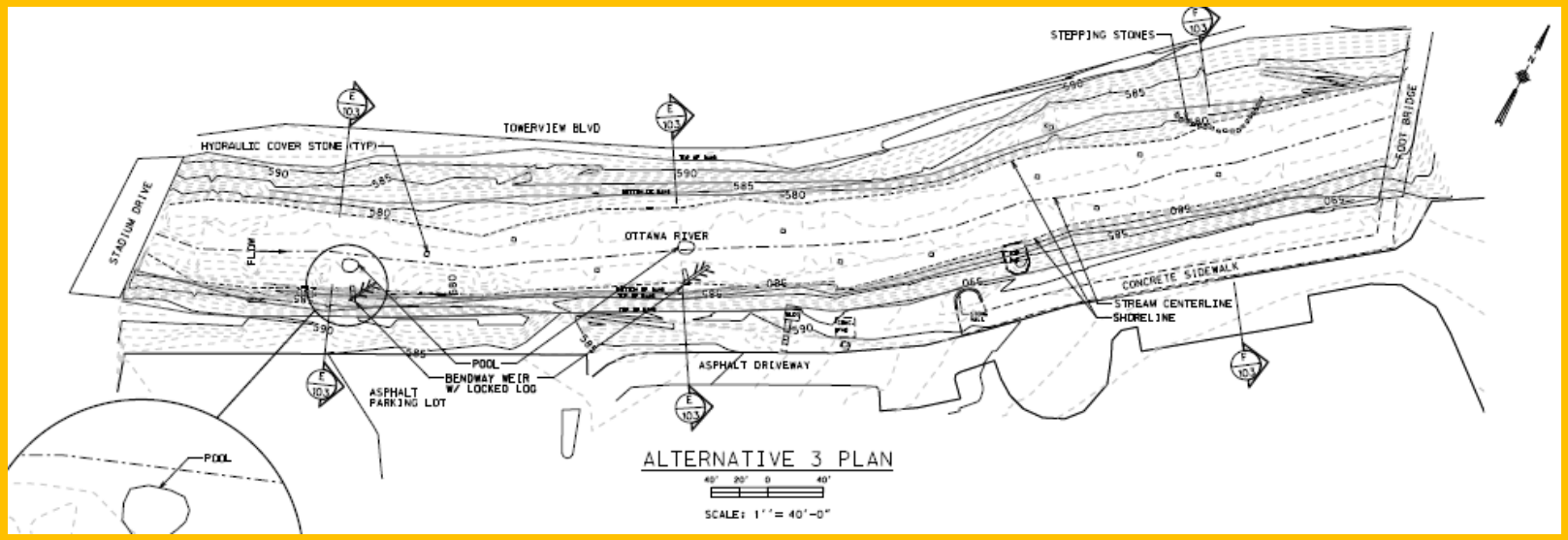
HUC 0410001 020

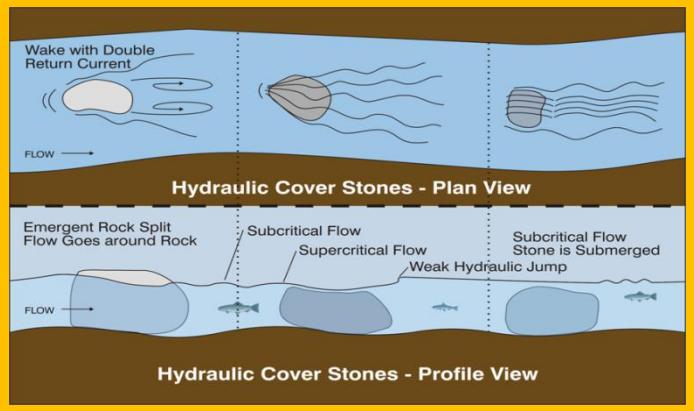


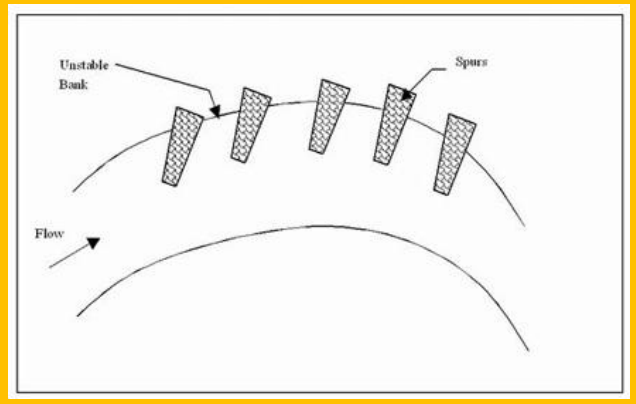
Tenmile Creek/Ottawa River Watershed

UT Tenmile Creek/Ottawa River Project Site

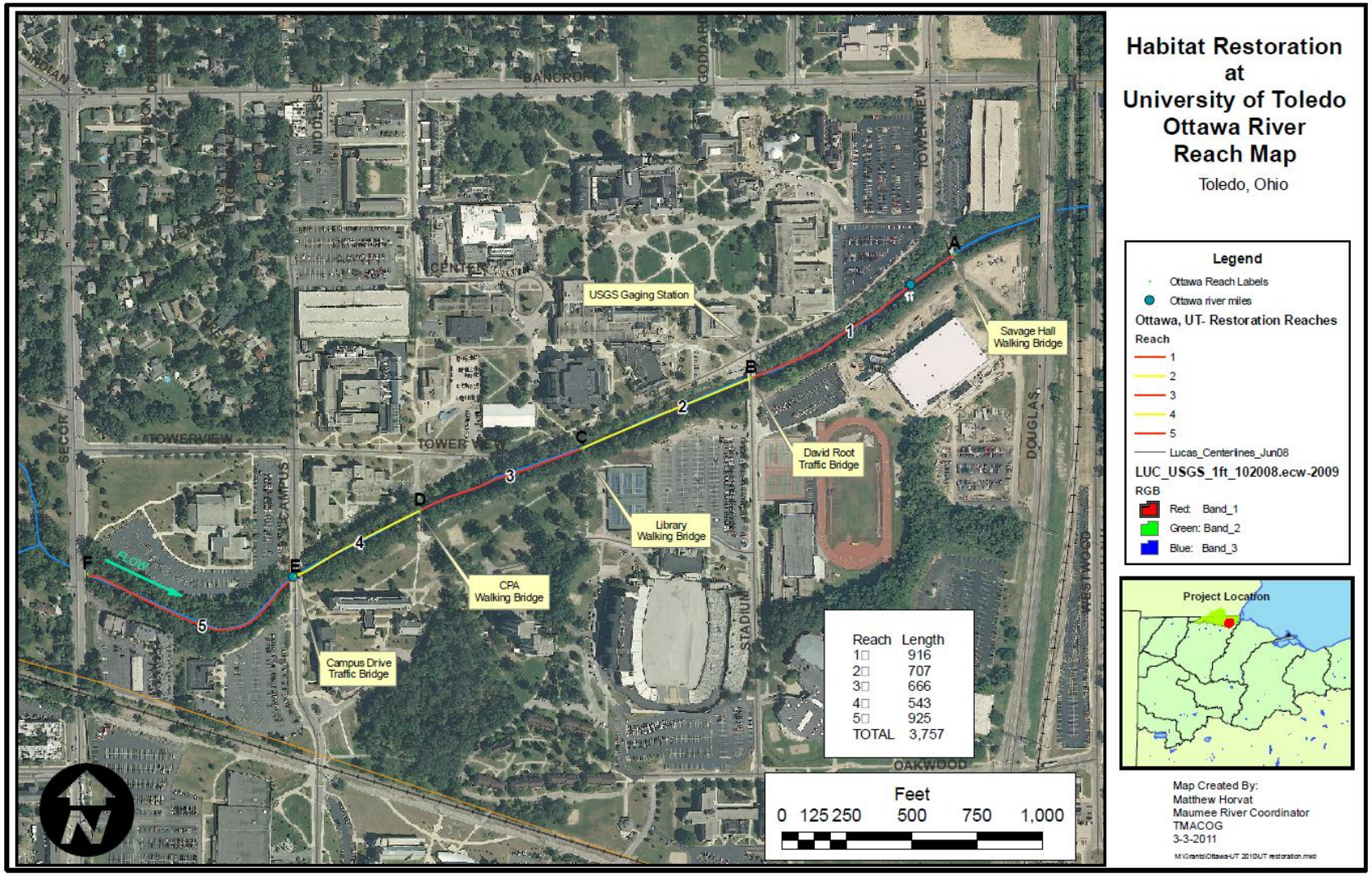
With funding secured from Stranahan Foundation in 2009 planning started on proposed in-stream and bank restoration for selected reach on UT campus, 900 feet adjacent to Savage Area, UT entered into agreement with ACOE Buffalo in FY11 to complete necessary survey, hydrological modeling and draft concept plans







Initial concept plans for river restoration of river reach 5 (900 feet adjacent to Savage Arena) as presented by ACOE Buffalo at March 2011 workshop



Additional funding secured from Ohio EPA ($235,195) and U.S. Fish and Wildlife Service ($114,132) in 2011 allowed for expansion of river restoration to include entire length of Ottawa River on the main campus of the University of Toledo, ACOE Buffalo District under agreement with University of Toledo for FY 2012 to complete design concepts and final plans for all 3,700 feet on campus.

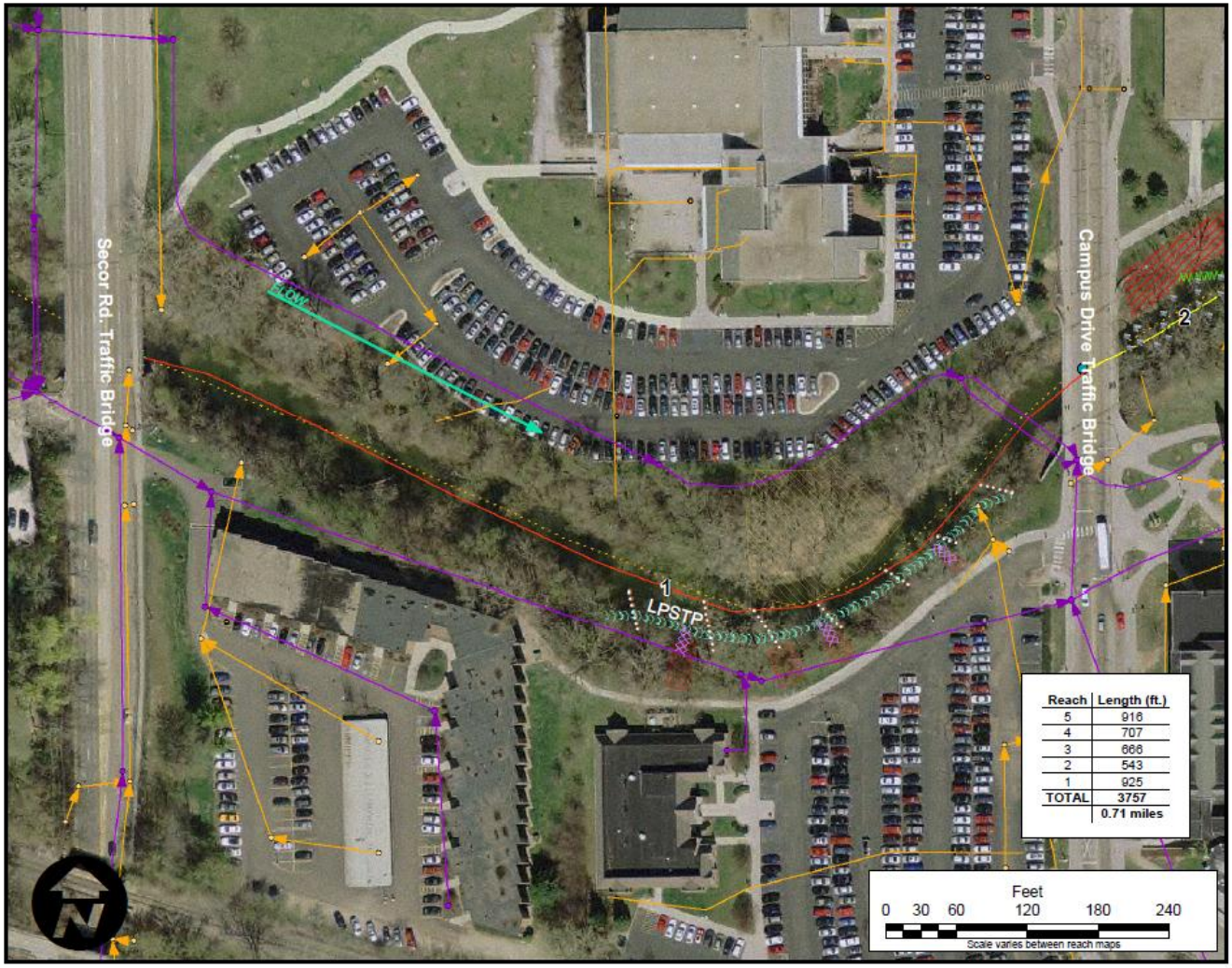
In order to determine the best choice of aquatic and bank plant species to install at the UT river restoration site, a series of test plantings were installed at a selected sample site with a mix of species including live stakes and plants placed in May/June 2011 with monitoring of their growth success ongoing from the Summer of 2011 to Summer 2012

Species planted included Button Bush, Dogwood, Sycamore, Pin Oak and River Bank Wild Rye

In the summer of 2011 OEPA conducts sampling within the Tenmile/Ottawa River watershed including on the UT campus and for pre-assessment of existing aquatic ecosystem conditions at the UT 319 river restoration project

In Fall 2011 ACOE Buffalo completes field surveys and cross sections

ACOE Buffalo preliminary design concepts presented for Reaches 1-5, UT Ottawa River Project site (November 2011)



Page 1 of

Habitat Restoration at
University of Toledo
Ottawa River Reach Map
Toledo, Ohio
Reach 1

Legend

Stones
- HCS
- HS HCS KEY
- SSBW
- STS
- keyway
- LPSTP
- Lunker
- LockedLog
- Path
- bendway weir

Areas

ITEM
- Access
- Access-find access lane
- Access/Staging
- clear
- clear - Keep lg CTTNWD
- clear acces path
- Sanitary Main
- Sanitary Sewer Manhole
- Storm Main
- Storm Sewer Manhole

note: utility directional arrows may be incorrect
-restoration elements not to scale

Map Created By:
Matthew Horvat
Maumee River Coordinator
TMACOG
3-3-2011, Update 10-25-2011

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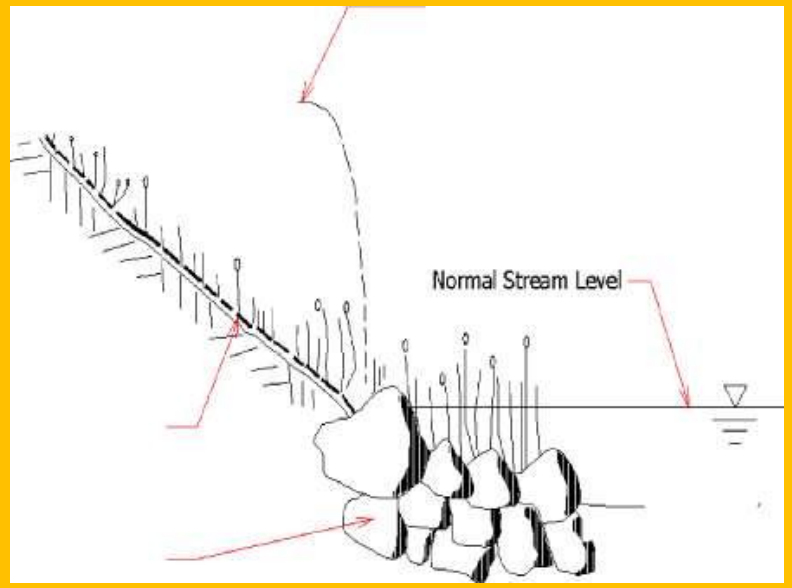
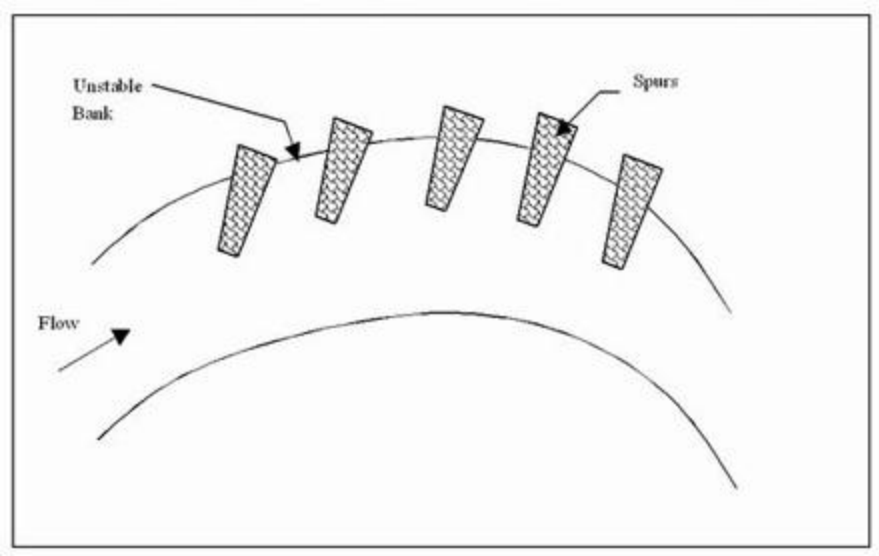
Reach 1 Concept Plan

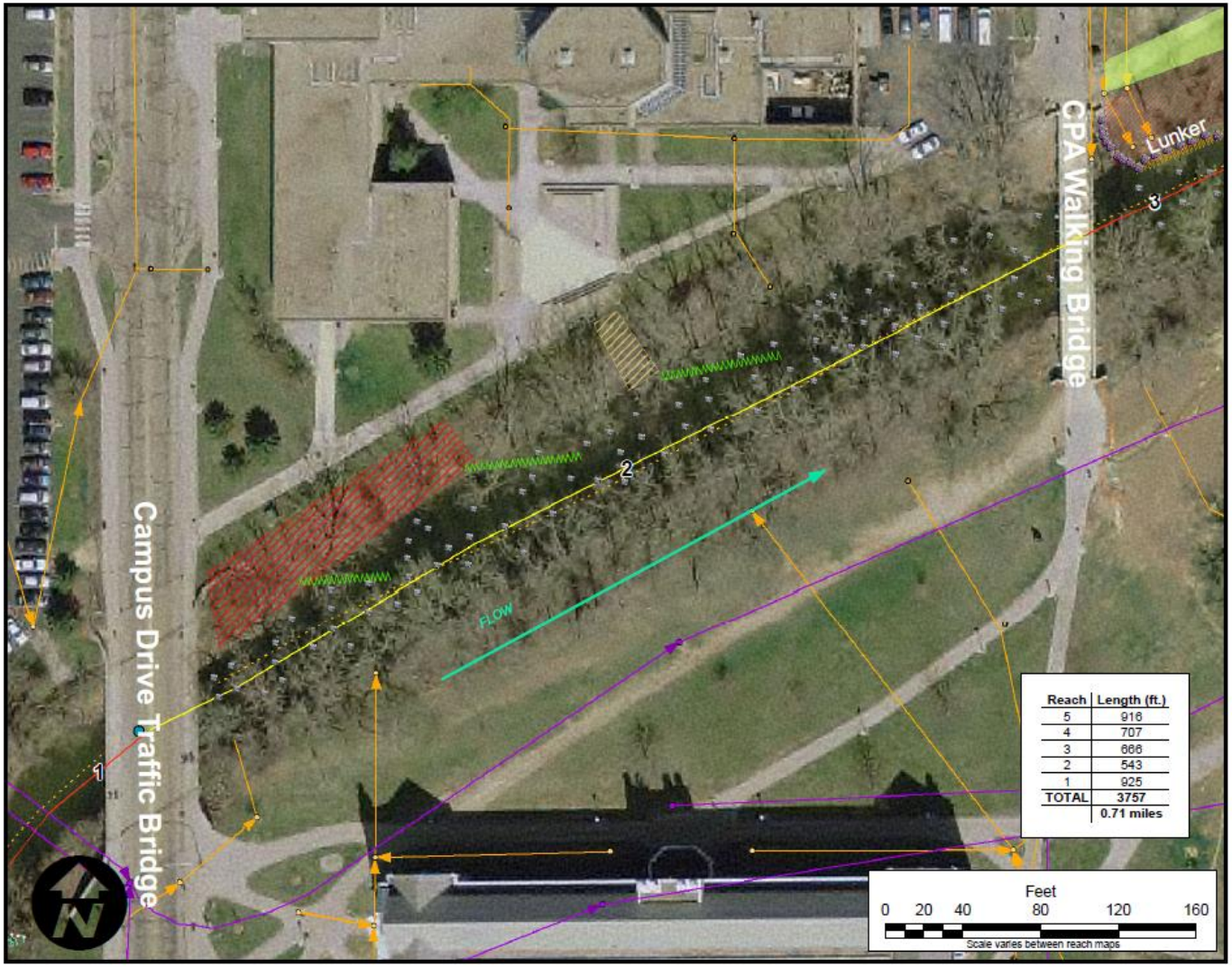


Longitudinal Stone Toe Protection



Bendway Weirs

Reach 1: Proposed In-stream Restoration Features



Habitat Restoration at
University of Toledo
Ottawa River Reach Map
Toledo, Ohio

Reach 2

Legend

Stones
- HCS
- HS HCS
- KEY
- SSBW
- STS
- keyway
- LPSTP
- Lunker
- LockedLog
- Path
- bendway weir

Areas

ITEM
- Access
- Access-find access lane
- Access/Staging
- clear
- clear - Keep lg CTTNWD
- clear acces path
- Sanitary Main
- Sanitary Sewer Manhole
- Storm Main
- Storm Sewer Manhole

note: utility directional arrows may be incorrect
-restoration elements not to scale

Map Created By:
Matthew Horvat
Maumee River Coordinator
TMACOG
3-3-2011, Update 10-25-2011

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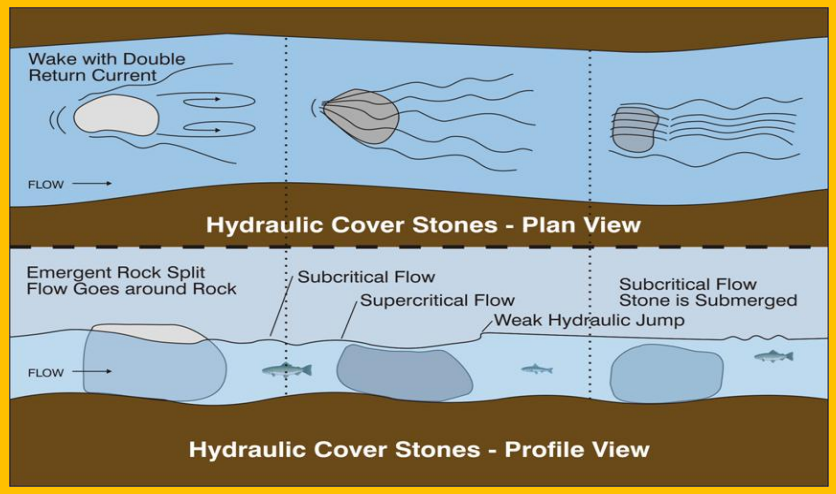
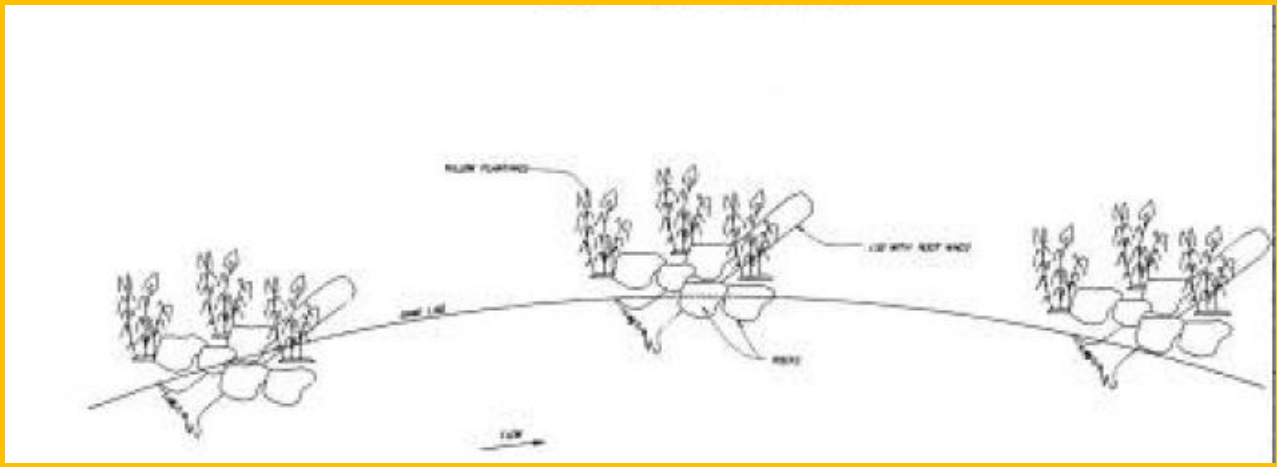
Reach 2 Concept Plan

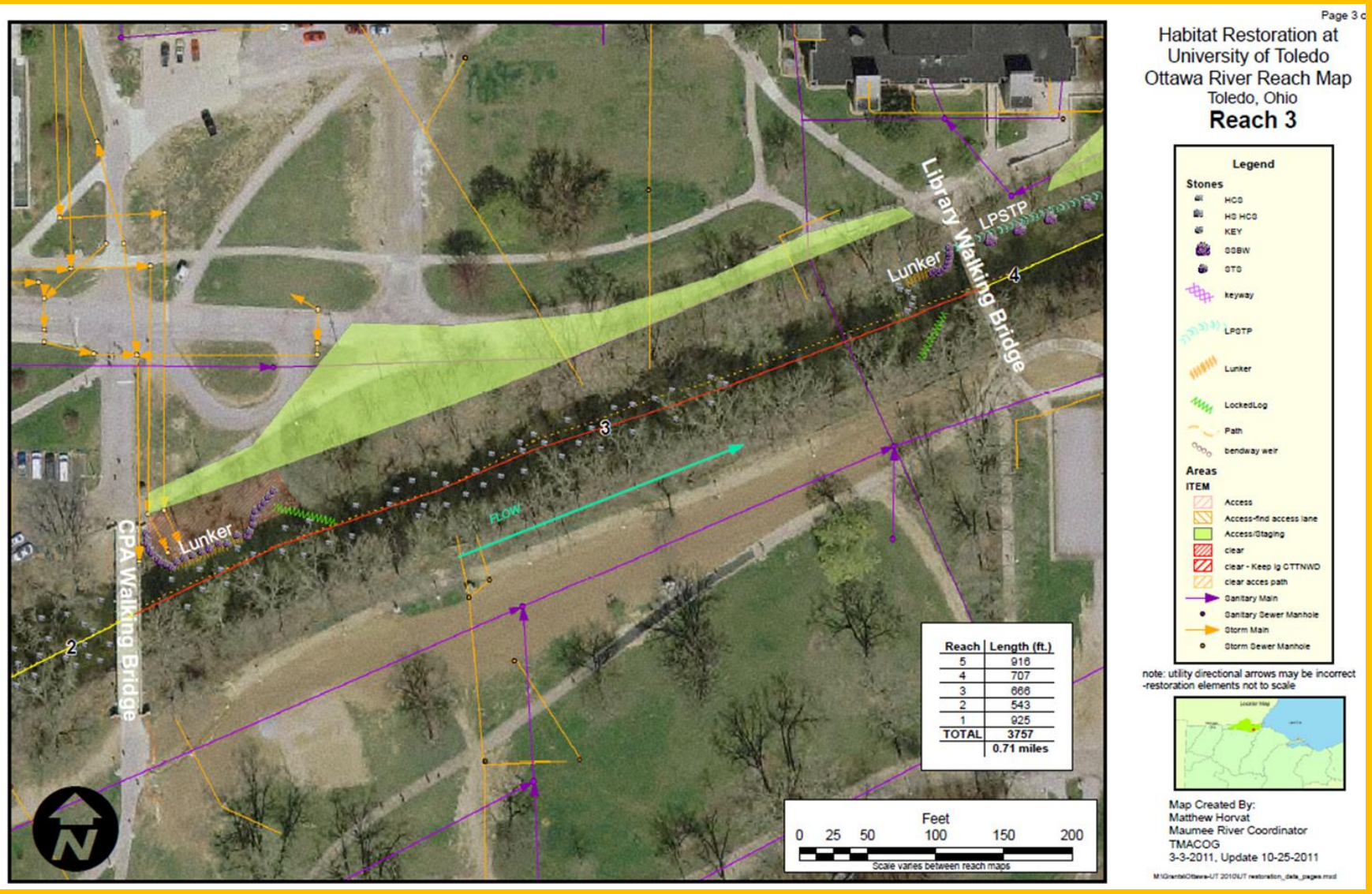


Hydraulic Cover Stones

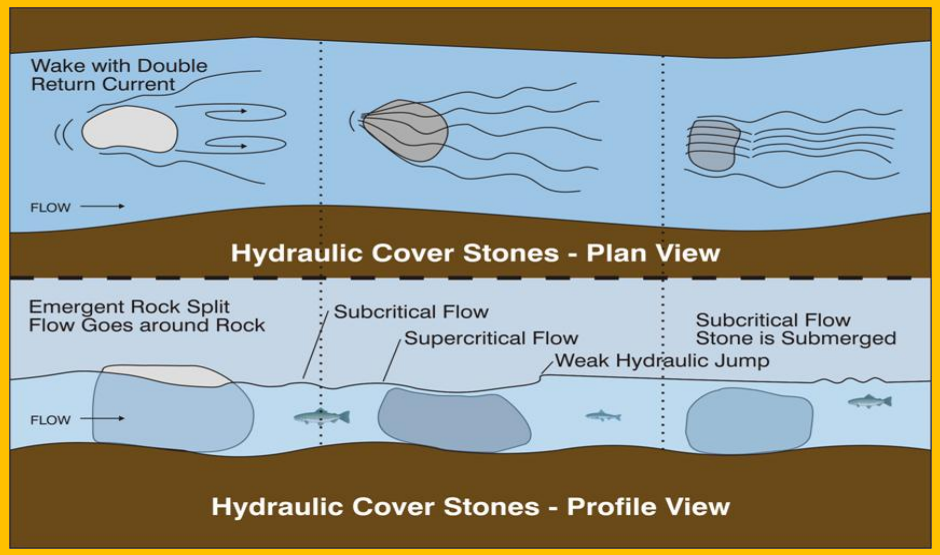


Locked Logs

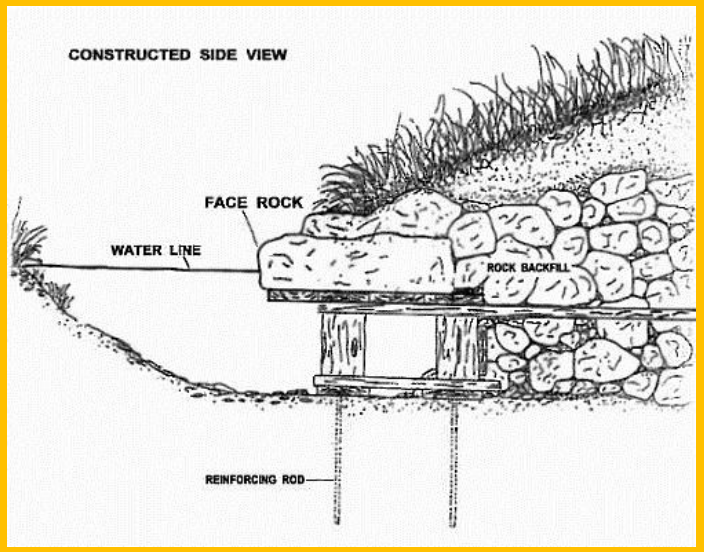
Reach 2: Proposed In-stream Restoration Features



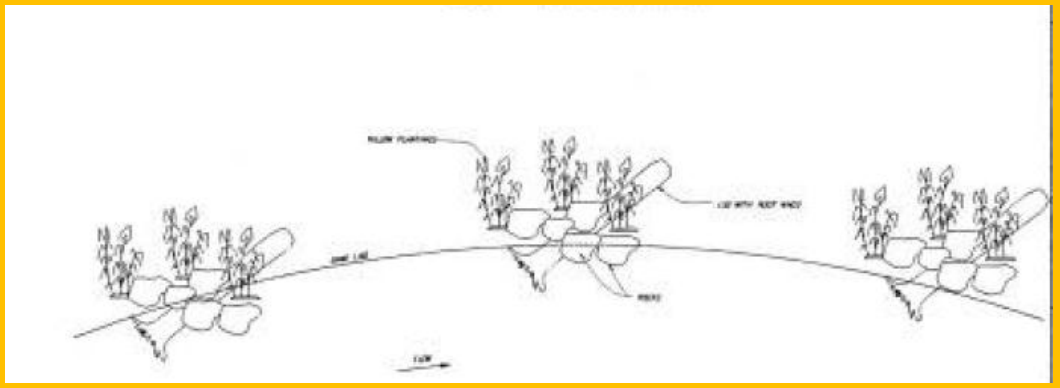
Reach 3 Concept Plan



Hydraulic Cover Stones

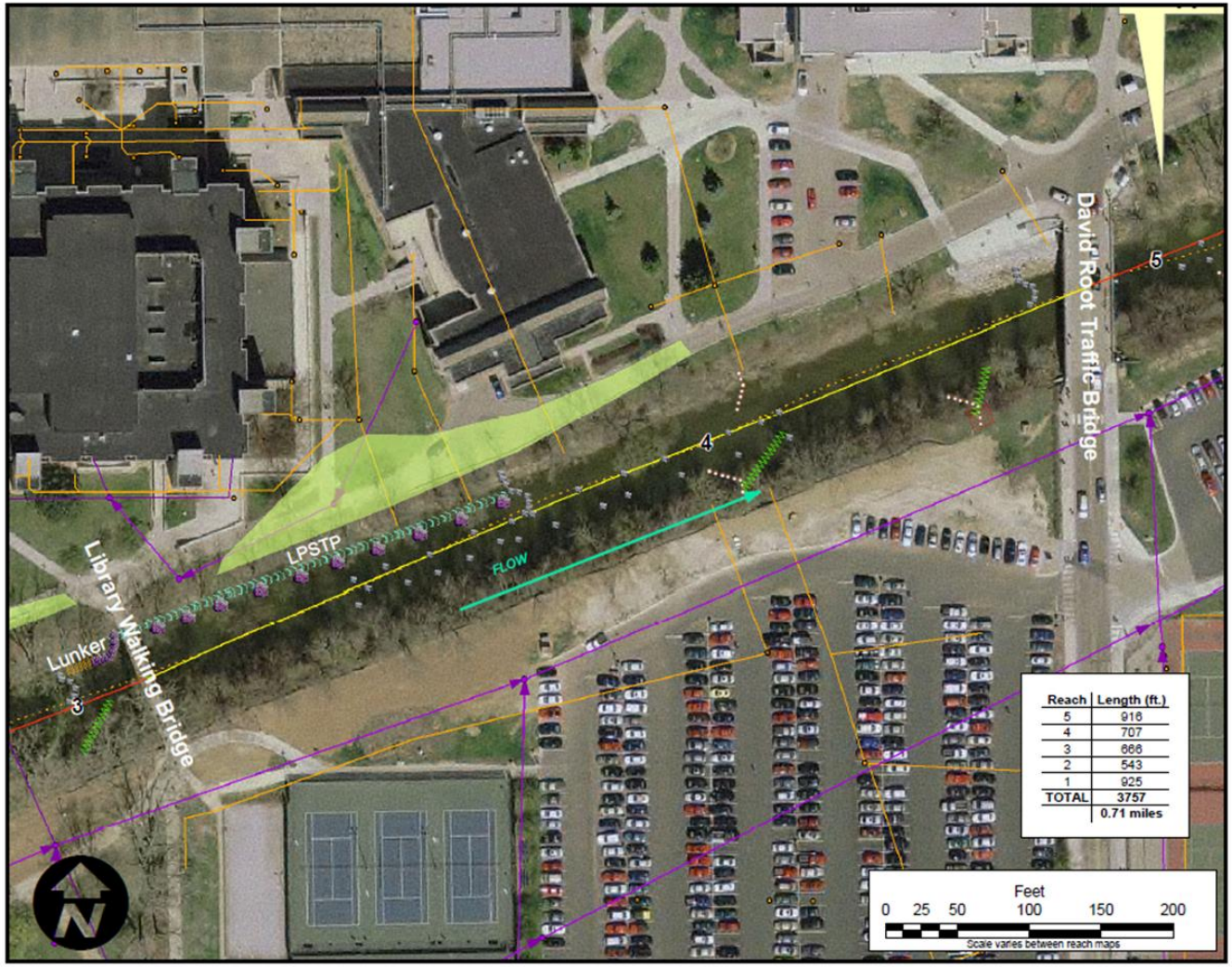


Lunker



Locked Logs

Reach 3: Proposed In-stream Restoration Features



Habitat Restoration at
University of Toledo
Ottawa River Reach Map
Toledo, Ohio

Reach 4

Legend

Stones
- HCG
- HG HCG
- KEY
- GGBW
- GTG
- keyway
- LPGTP
- Lunker
- LockedLog
- Path
- bendway weir

Areas

ITEM
- Access
- Access-find access lane
- Access/Staging
- clear
- clear - Keep lg CTTNWD
- clear acces path
- Sanitary Main
- Sanitary Sewer Manhole
- Storm Main
- Storm Sewer Manhole

note: utility directional arrows may be incorrect
-restoration elements not to scale

Map Created By:
Matthew Horvat
Maumee River Coordinator
TMACOG
3-3-2011, Update 10-25-2011

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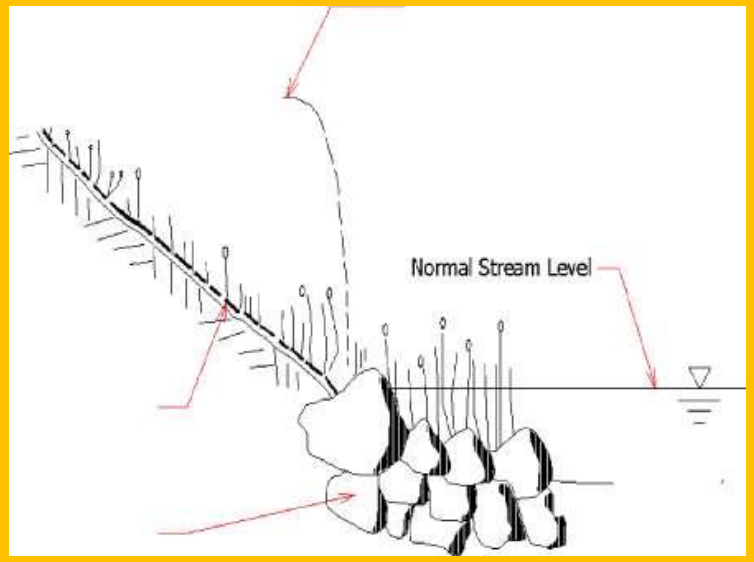
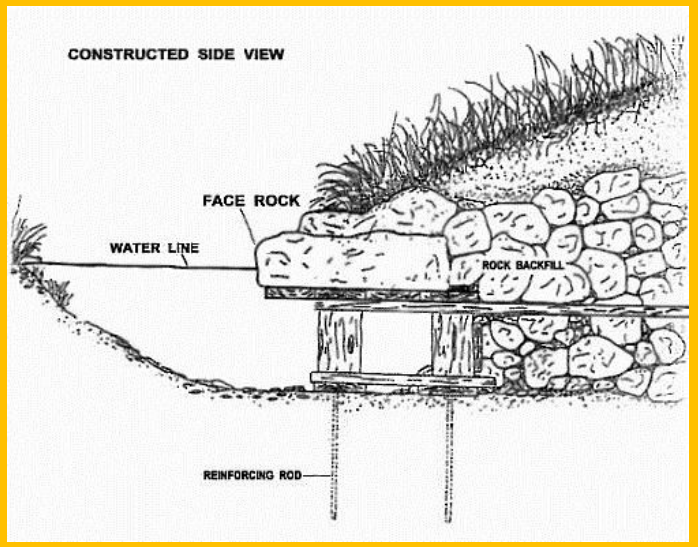
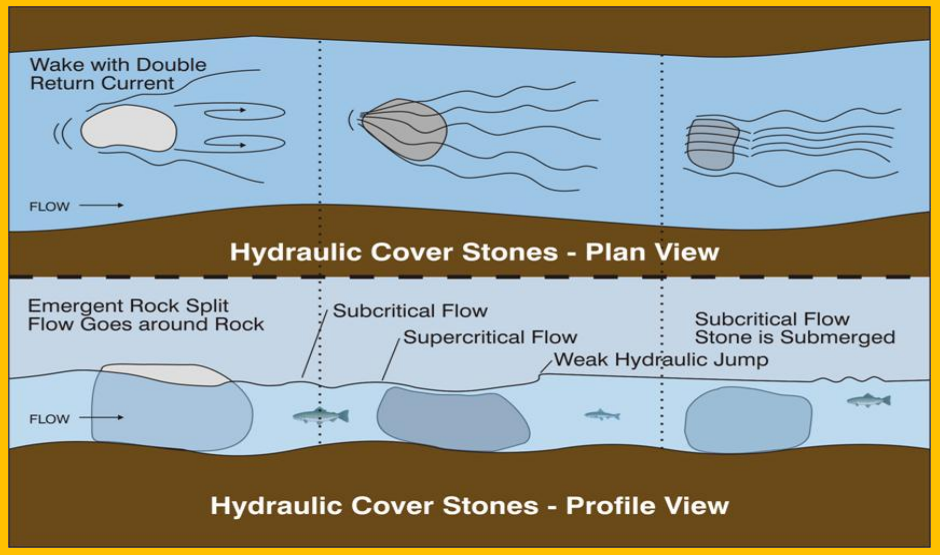
Reach 4 Concept Plan



Longitudinal Stone Toe Protection

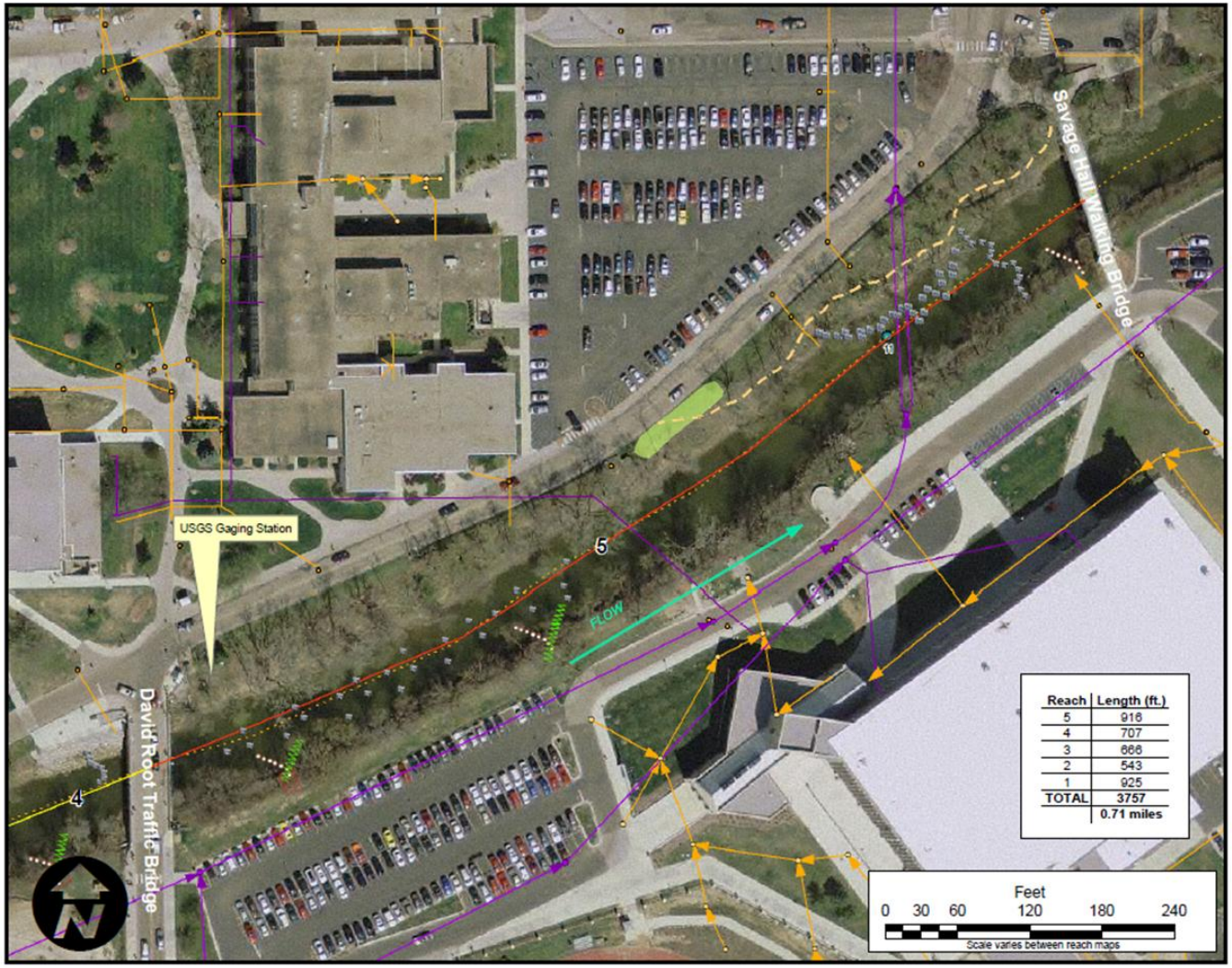


Lunker



Hydraulic Cover Stones

Reach 4: Proposed In-stream Restoration Features



Page 5 of

Habitat Restoration at
University of Toledo
Ottawa River Reach Map
Toledo, Ohio
Reach 5

Legend

Stones
- HCG
- HS HCG
- KEY
- GGBW
- GTG
- keyway
- LPGTP
- Lunker
- LockedLog
- Path
- bendway weir

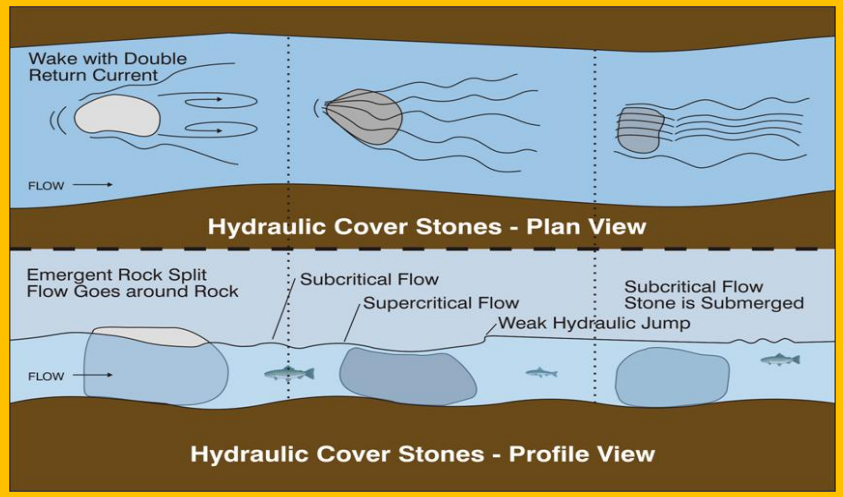
Areas
ITEM
- Access
- Access-find access lane
- Access/Staging
- clear
- clear - Keep lg CTTNWD
- clear acces path
- Sanitary Main
- Sanitary Sewer Manhole
- Storm Main
- Storm Sewer Manhole

note: utility directional arrows may be incorrect
-restoration elements not to scale

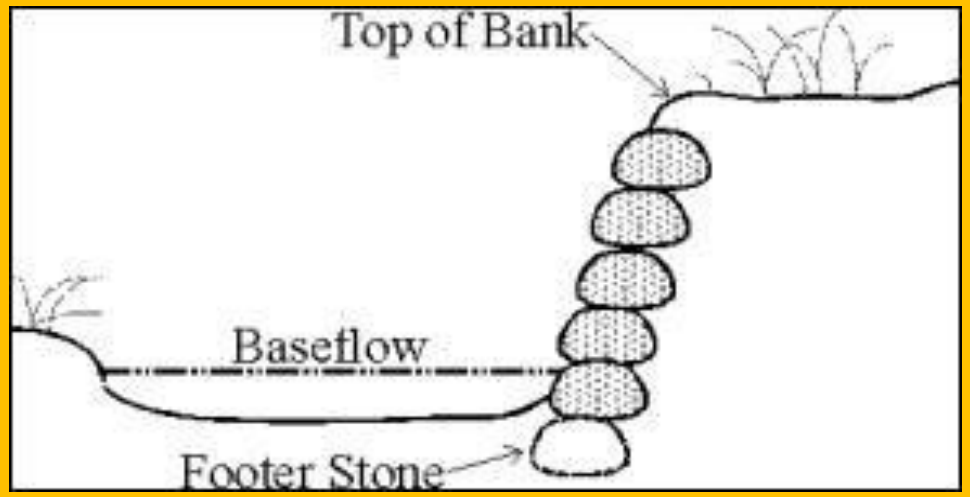
Map Created By:
Matthew Horvat
Maumee River Coordinator
TMACOG
3-3-2011, Update 10-25-2011

M:\Grants\Ottawa-UT 2010\UT restoration_data_pages.mxd

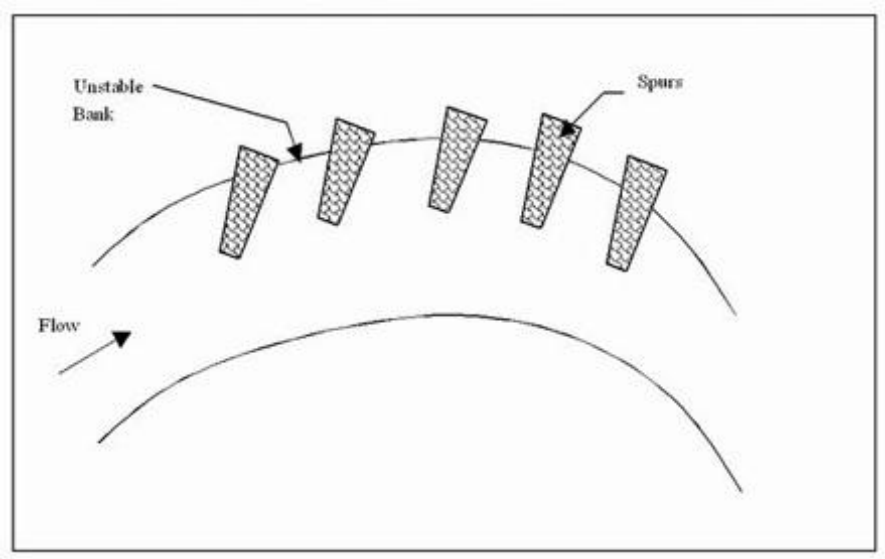
Reach 5 Concept Plan



Hydraulic Cover Stones



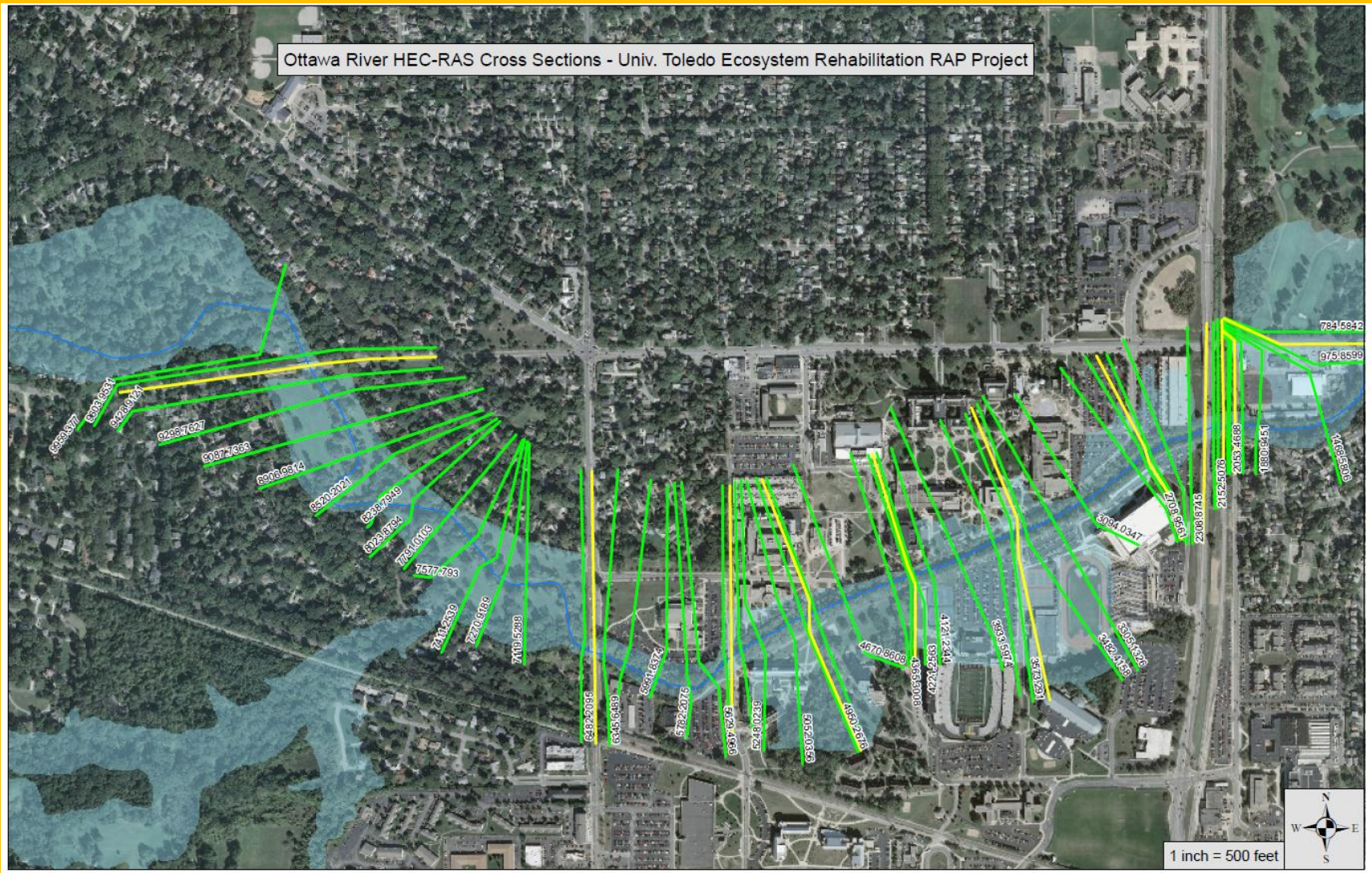
Structural Transitioning Stones



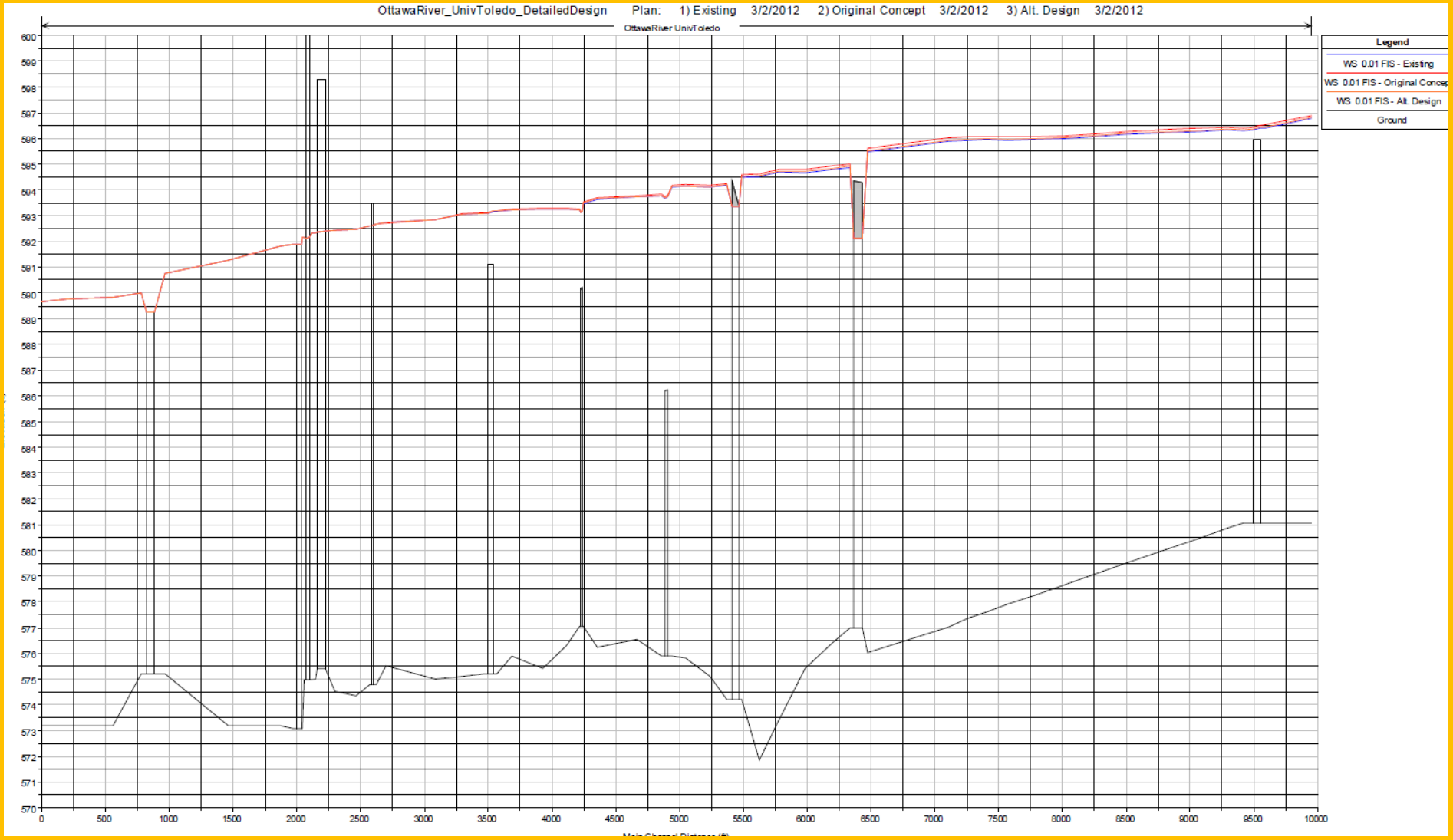
Bendway Weirs

Reach 5: Proposed In-stream Restoration Features

In February 2012 ACOE Buffalo conducts hydrological modeling of stream flow conditions with proposed in-stream restoration features in place following Reach 1-5 concept plans



100 year flow elevations from ACOE Buffalo HEC-RAS model runs showing existing conditions --- preliminary (original concept plans --- and alternative design --- with reduction in number of in-stream structures



Preliminary results from the HEC-RAS indicated a net rise in the 100 flood elevation from 0.006 to 0.10 feet starting in reach 3 and increasing *upstream* through reach 1 and into Village of Ottawa Hills (Secor to Bancroft Street)

FEMA federal regulations and Lucas County will not allow for ***any*** rise in 100 year floor levels with placement of structures in the river channel, without full public approval

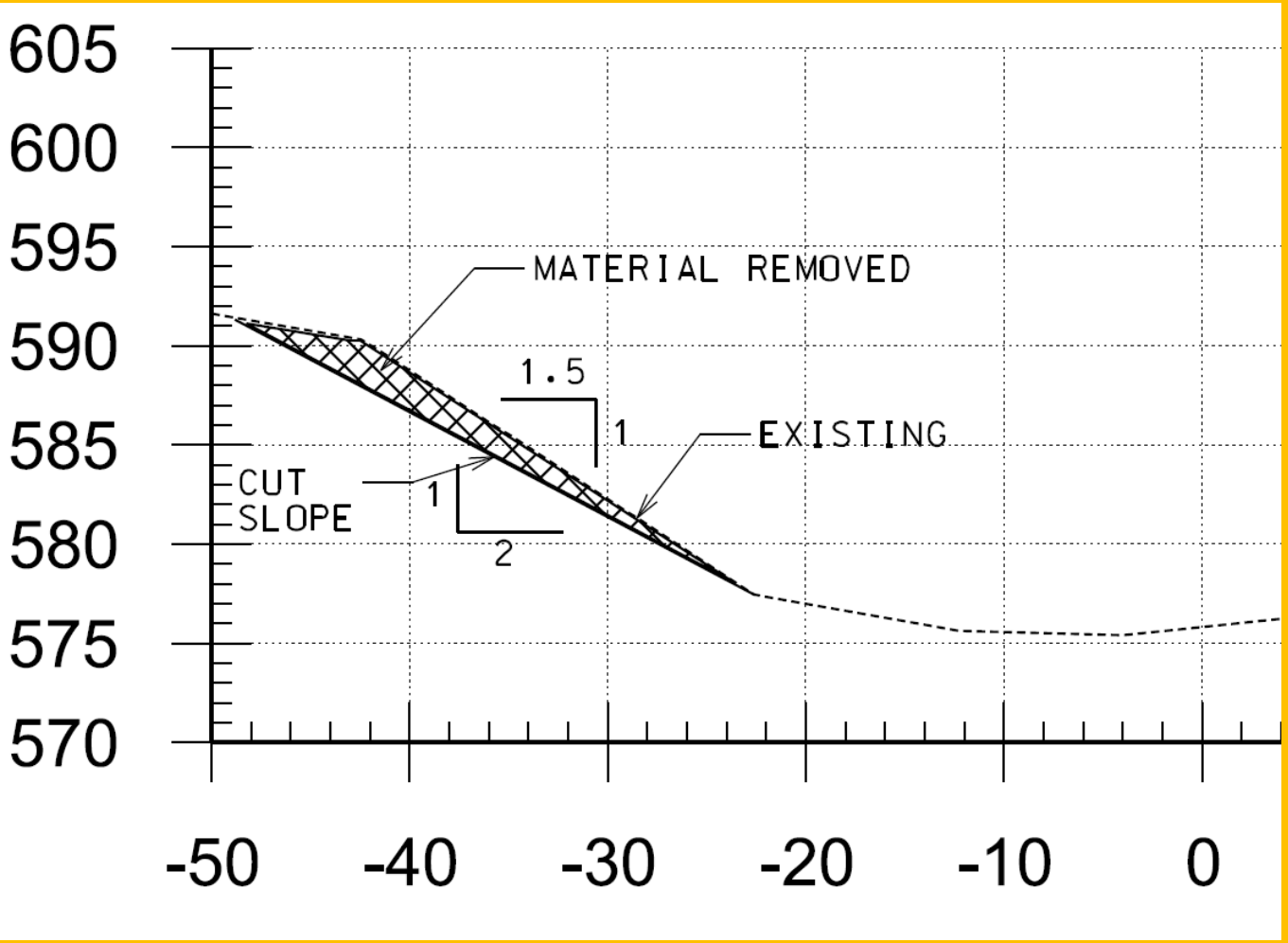
ACOE Buffalo begins to run alternative models starting with reducing size and number of proposed structures in the original concept plan to a more minimal design

For more details on the technical aspects of the HEC-RAS modeling for this project refer to the July 2nd, 2012 report prepared by ACOE Buffalo

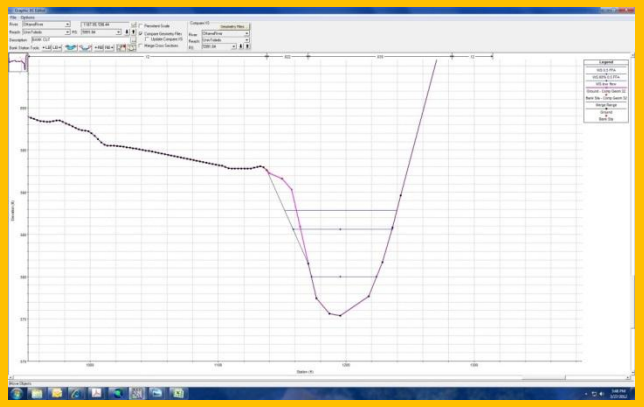
PRELIMINARY Results from hydraulic model

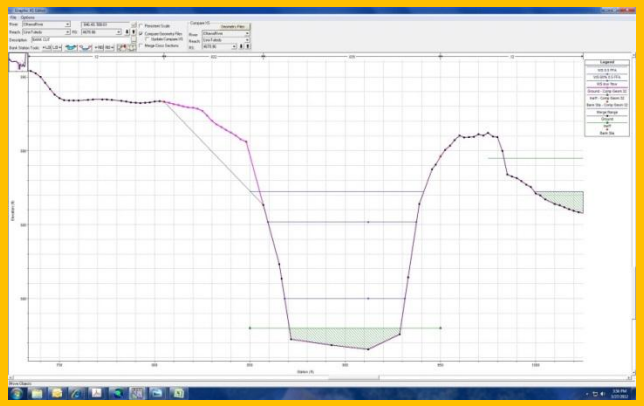
Existing				Original Concept			Minimal Design	
River Sta	Q Total	W.S. Elev		W.S. Elev	Δ		W.S. Elev	Δ
	(cfs)	(ft)		(ft)	(ft)		(ft)	(ft)
9959.38	6160	596.78		596.88	0.1		596.8	0.02
9603.95	6160	596.42		596.53	0.11		596.44	0.02
9530.45	Bancroft St (Ottawa Hills)							
9428.91	6160	596.29		596.4	0.11		596.31	0.02
9298.76	6160	596.33		596.44	0.11		596.35	0.02
9087.74	6160	596.28		596.39	0.11		596.3	0.02
8906.98	6160	596.25		596.36	0.11		596.27	0.02
8520.2	6160	596.16		596.28	0.12		596.18	0.02
8238.79	6160	596.04		596.16	0.12		596.06	0.02
8023.88	6160	595.99		596.11	0.12		596.01	0.02
7791.01	6160	595.95		596.07	0.12		595.97	0.02
7577.79	6160	595.93		596.05	0.12		595.95	0.02
7411.25	6160	595.95		596.07	0.12		595.97	0.02
7270.92	6160	595.94		596.06	0.12		595.96	0.02
7119.53	6160	595.9		596.03	0.13		595.92	0.02
6482.21	6160	595.47		595.61	0.14		595.5	0.03
6405.92	Secor Dr							
6345.65	6160	594.88		595.01	0.13		594.9	0.02
6208.25	6160	594.78		594.91	0.13		594.81	0.03
5991.84	6160	594.67		594.81	0.14		594.7	0.03
5782.21	6160	594.69		594.81	0.12		594.71	0.02
5629.5	6160	594.51		594.62	0.11		594.54	0.03
5496.63	6160	594.48		594.59	0.11		594.5	0.02
5450.59	W. Campus Dr							
5378.73	6160	594.18		594.24	0.06		594.21	0.03
5248.02	6160	594.11		594.18	0.07		594.12	0.01
5052.04	6160	594.14		594.21	0.07		594.15	0.01
4950.27	6160	594.11		594.18	0.07		594.12	0.01
4906.21	CPA							
4866.86	6160	593.76		593.82	0.06		593.78	0.02
4670.86	6160	593.72		593.77	0.05		593.73	0.01
4365.3	6160	593.64		593.7	0.06		593.65	0.01
4253.44	6160	593.46		593.52	0.06		593.48	0.02
4235.67	Library							
4221.26	6160	593.21		593.25	0.04		593.22	0.01
4121.23	6160	593.25		593.3	0.05		593.26	0.01
3933.6	6160	593.25		593.29	0.04		593.26	0.01
3693.87	6160	593.23		593.26	0.03		593.23	0
3573.29	6160	593.16		593.19	0.03		593.17	0.01
3532.95	Stadium Dr							
3482.42	6160	593.08		593.11	0.03		593.09	0.01
3305.13	6160	593.05		593.08	0.03		593.06	0.01
3094.03	6160	592.84		592.85	0.01		592.84	0
2708.96	6160	592.73		592.7	-0.03		592.72	-0.01
2627.12	6160	592.69		592.68	-0.01		592.68	-0.01

Another approach is proposed by ACOE Buffalo to create a series of cut bank features (see concept below) in reaches s 1-3 to provide for additional excess flood capacity storage in additional to continued reduction in the number, type and size of in-stream structures especially in reaches 1-3.



ACOE Buffalo runs further series of HEC-RAS models with variations in number and length of three proposed cut banks with original restoration plans in place

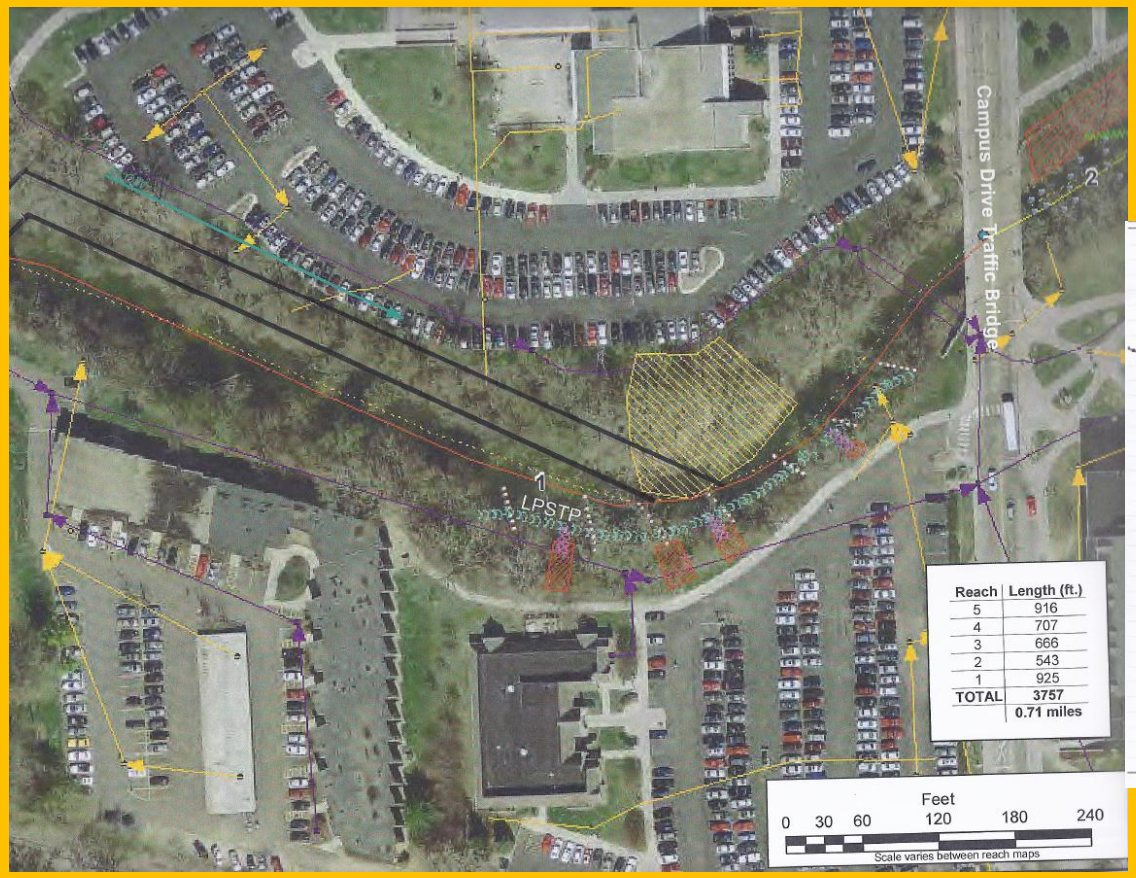




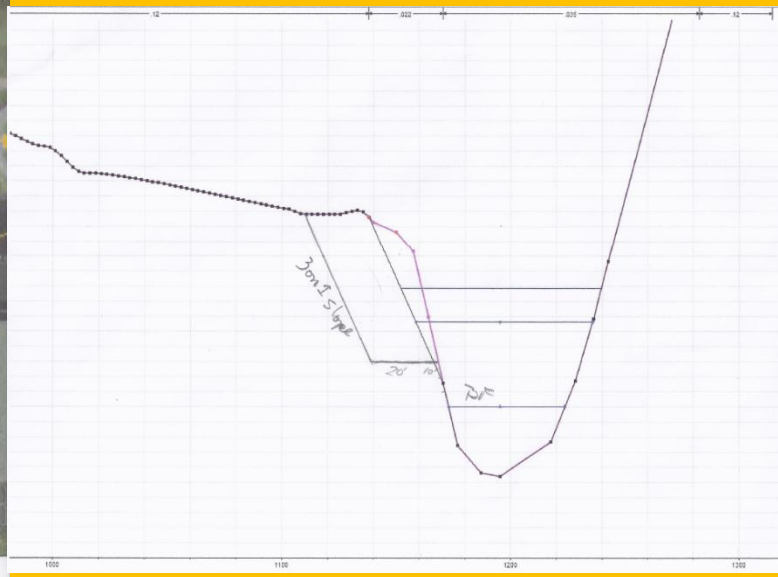
PRELIMINARY Results from hydraulic model

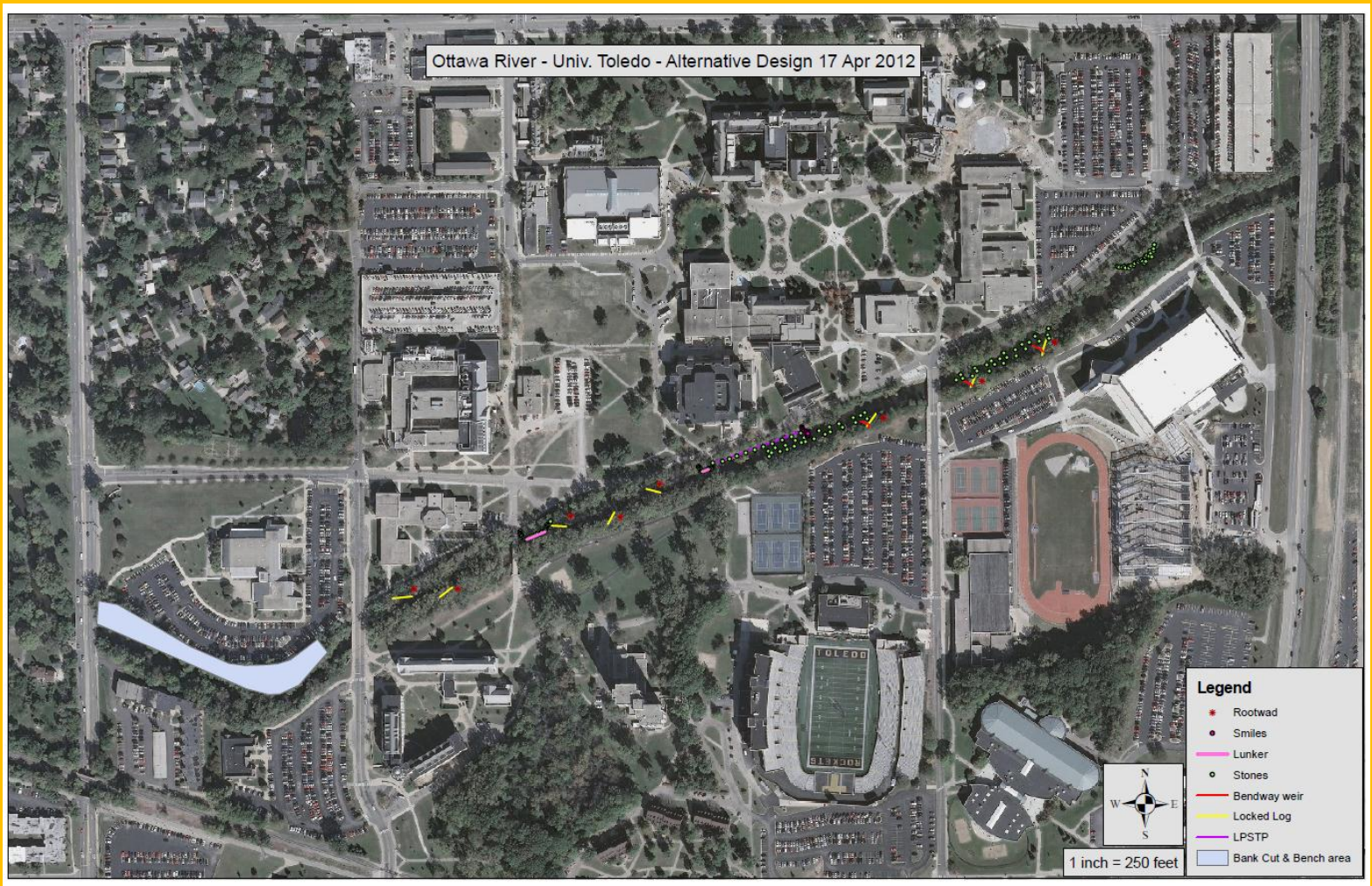
	Existing			Original Concept		Original Concept with BankCuts	
River Sta	Q Total	W.S. Elev		W.S. Elev	Δ	W.S. Elev	Δ
	(cfs)	(ft)		(ft)	(ft)	(ft)	(ft)
9959.38	6160	596.78		596.88	0.1	596.77	-0.01
9603.95	6160	596.42		596.53	0.11	596.42	0
9530.45	Bancroft St (Ottawa Hills)						
9428.91	6160	596.29		596.4	0.11	596.29	0
9298.76	6160	596.33		596.44	0.11	596.33	0
9087.74	6160	596.28		596.39	0.11	596.28	0
8906.98	6160	596.25		596.36	0.11	596.25	0
8520.2	6160	596.16		596.28	0.12	596.16	0
8238.79	6160	596.04		596.16	0.12	596.04	0
8023.88	6160	595.99		596.11	0.12	595.98	-0.01
7791.01	6160	595.95		596.07	0.12	595.95	0
7577.79	6160	595.93		596.05	0.12	595.93	0
7411.25	6160	595.95		596.07	0.12	595.94	-0.01
7270.92	6160	595.94		596.06	0.12	595.93	-0.01
7119.53	6160	595.9		596.03	0.13	595.9	0
6482.21	6160	595.47		595.61	0.14	595.47	0
6405.92	Secor Dr						
6345.65	6160	594.88		595.01	0.13	594.87	-0.01
6208.25	6160	594.78		594.91	0.13	594.84	0.06
5991.84	6160	594.67		594.81	0.14	594.77	0.1
5782.21	6160	594.69		594.81	0.12	594.76	0.07
5629.5	6160	594.51		594.62	0.11	594.61	0.1
5496.63	6160	594.48		594.59	0.11	594.57	0.09
5450.59	W. Campus Dr						
5378.73	6160	594.18		594.24	0.06	594.23	0.05
5248.02	6160	594.11		594.18	0.07	594.22	0.11
5052.04	6160	594.14		594.21	0.07	594.22	0.08
4950.27	6160	594.11		594.18	0.07	594.19	0.08
4906.21	CPA						
4866.86	6160	593.76		593.82	0.06	593.82	0.06
4670.86	6160	593.72		593.77	0.05	593.79	0.07
4365.3	6160	593.64		593.7	0.06	593.7	0.06
4253.44	6160	593.46		593.52	0.06	593.52	0.06
4235.67	Library						
4221.26	6160	593.21		593.25	0.04	593.25	0.04
4121.23	6160	593.25		593.3	0.05	593.3	0.05
3933.6	6160	593.25		593.29	0.04	593.29	0.04

Focus moves to considering one cut bank features to be constructed along north bank of reach 1 with aim to reach a balance between maximizing size (length/width) of the cut bank with the total number of in-stream restoration structures to be placed in reaches 2-5 (and with no in-stream structures in reach 1) in order to result in zero (0) foot rise in upstream 100 year flood elevations in Ottawa Hills



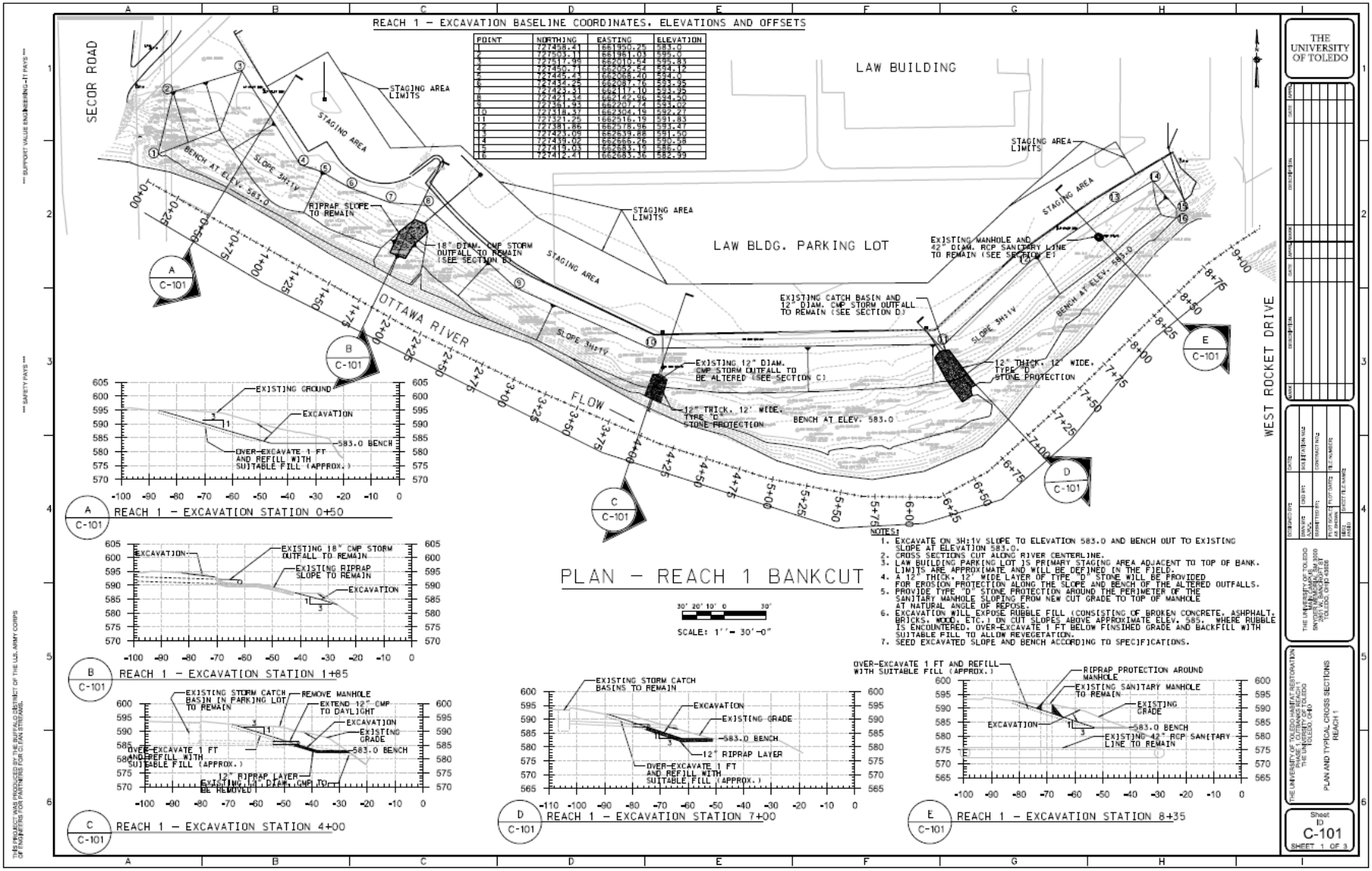
Reach	Length (ft.)
5	916
4	707
3	666
2	543
1	925
TOTAL	3757
	0.71 miles



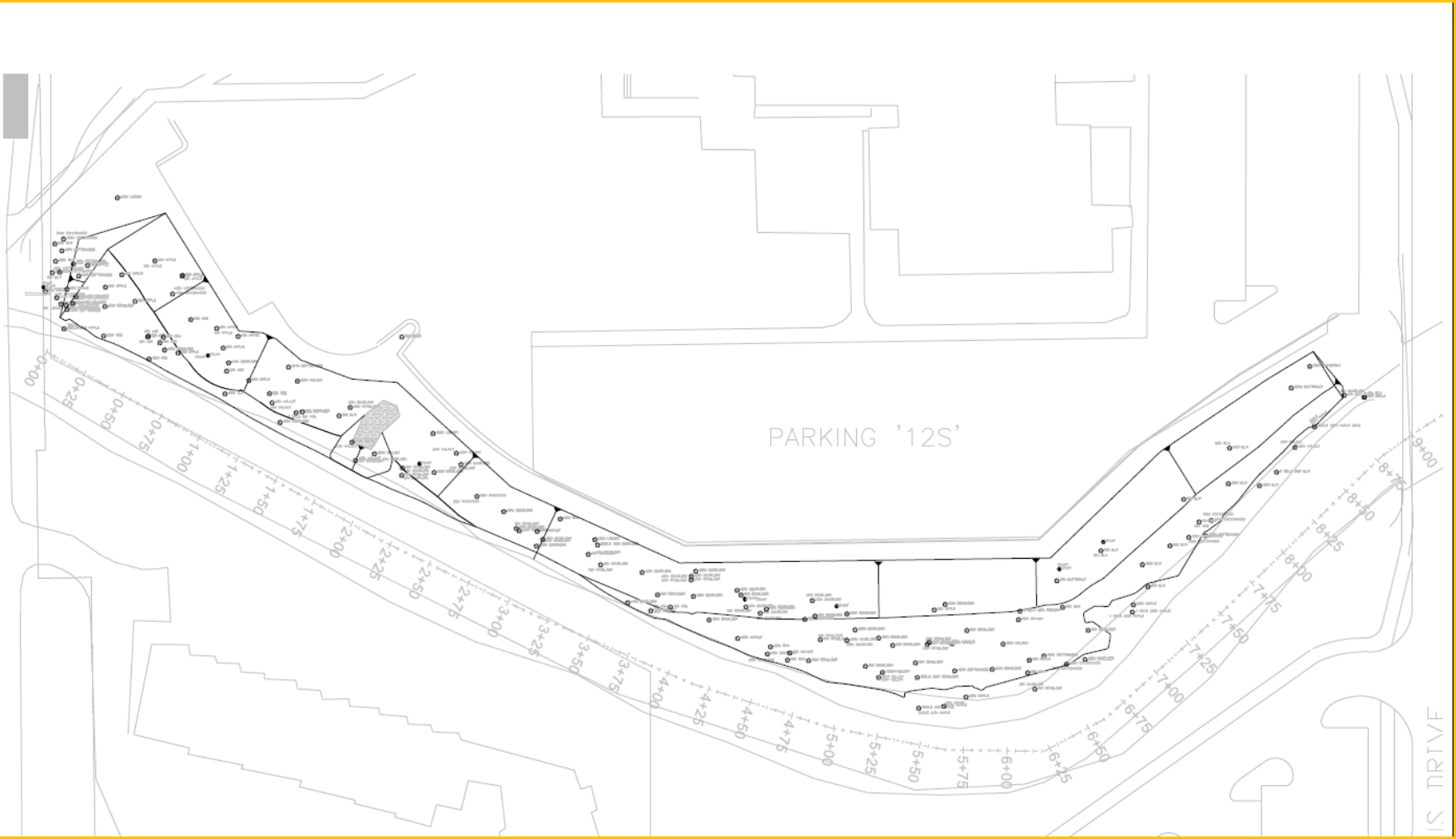


In April 2012 ACOE Buffalo completes final analysis and proposes a 900 foot cut bank in reach one along with alternative plan for in-stream restoration structures in reaches 2-5.

Draft design plans for Phase II: In-Stream Restoration features, currently in final review with scheduled construction in August 2013



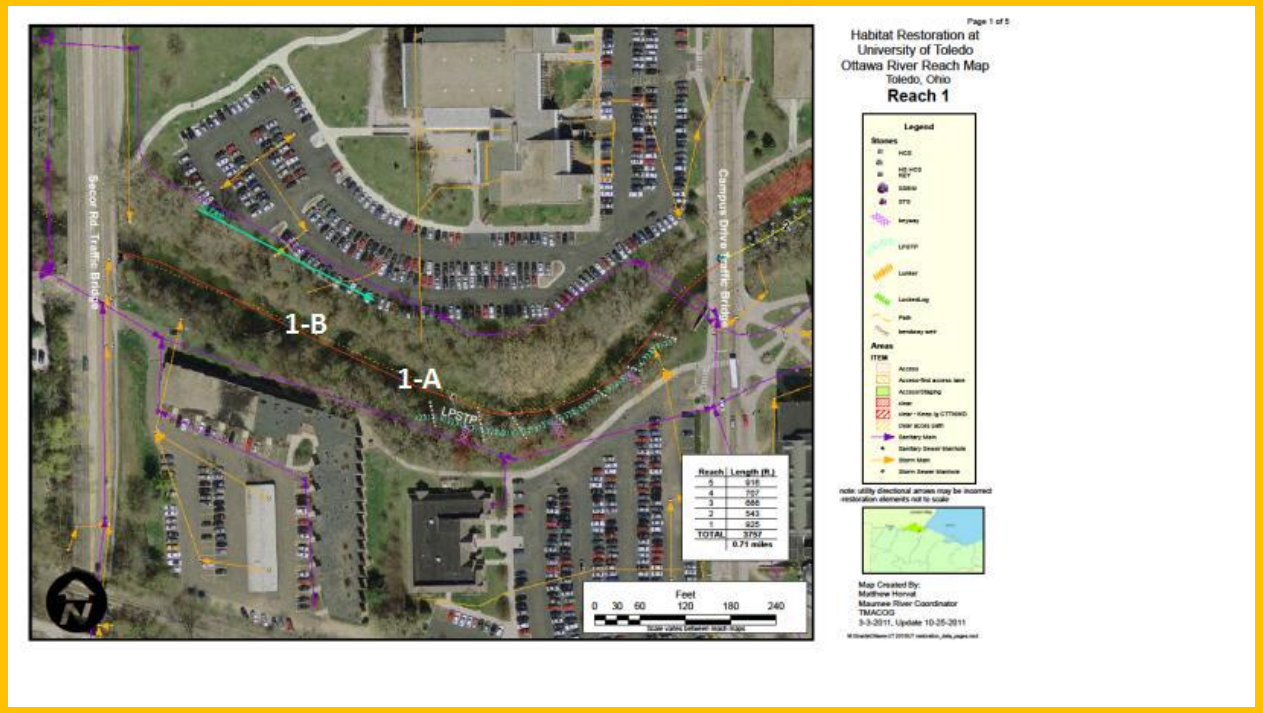
Final design for Phase I of the UT Ottawa River Restoration Project: construction of a cut bank in reach 1, north bank adjacent to the UT Law School (June 2012)



In order to prepare for the construction of the cut bank, plans are prepared for the identification and mapping of the approximate 123 trees that will need to first be removed from the site

Site of Cutbank feature (April 2012)

In advance of the proposed tree removal, necessary as the first step in construction of the cut bank in reach I, USFWS required a survey for Indiana Bat (federally endangered species) at the site. Field survey and collection was completed on two nights at the site (June 7-8, 2012) revealing no presence of the species



Artistic rendering of the cut bank feature

Trees to come down as Ottawa River restoration project continues

By Vicki L. Knoll

Approximately 100 trees on the banks of the Ottawa River near the Law Center on Main Campus will be cut down in the coming weeks as work continues on the waterway's restoration.

"The trees range in size from six inch in diameter to some larger cottonwoods three feet in diameter," said Dr. Patrick Lawrence, professor and chair of the Department of Geography and Planning, and chair of the President's Commission on the River. "Some of these trees are dead or dying, and there are some ash trees that will be coming down."

Aaron Tree and Lawn of Toledo will undertake the clearing project.

"Initial design work on the river restoration determined that we need to create a cut bank area that will allow for more water storage during higher river levels," Lawrence said. "We didn't anticipate this when the project started, but it's a requirement for a federal permit.

"Removing these trees is a necessity, not a choice," he emphasized. "This area adjacent to the Law Center parking lot is the only site requiring extensive tree removal for the river restoration project. And replanting — from grasses to small trees and shrubs — is part of the overall plan."

A $235,000 grant from the Ohio Environmental Protection Agency and a $111,000 grant from the U.S. Fish and Wildlife Service are funding the Ottawa River restoration.

Once the trees are cleared, a section will be dug out to create the cut bank and widen the land on the north side of the river at that site.

Lawrence explained that phase two of the restoration calls for adding in-stream elements with natural materials — rock, tree trunks, wood — to create changes in water flow, and that has the potential to affect the 100-year flood level in the river.

"When you do work like that in a river, you can't raise the water level more than it would rise naturally," he said. "We haven't had an event like that for decades, but you have to design for it just in case."

The cut bank will have long-term benefits.

"The area will be more open and accessible to people. It'll be a great opportunity to have an overlook to the river on the north bank by the Law Center and maybe put in a trail and benches," Lawrence said. "There's no funding for those now in this project, but we are optimistic for the future to search for grants and other means."

Photo by Daniel Miller

Trees on the north bank of the Ottawa River by the Law Center parking lot will be cleared this summer so that a cut bank can be created as part of the waterway's restoration.

Phase two of the restoration will begin in August 2013 when the in-stream elements are added to create diversity in the river. Interpretative signage will be placed along the waterway to explain the work to the campus community and visitors.

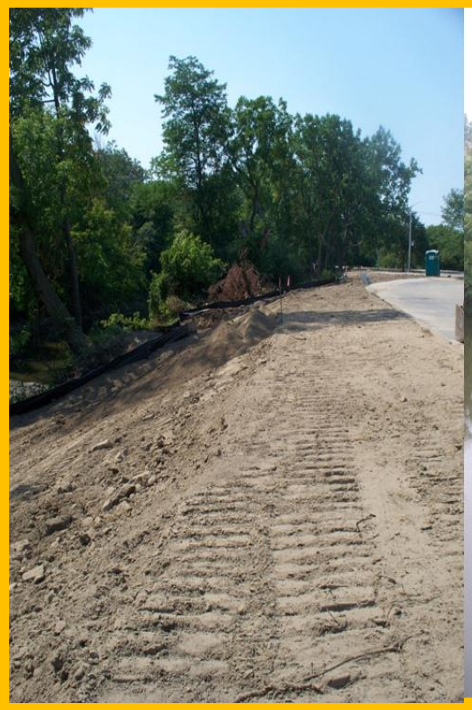
This demonstration and education project will mean more fish and wildlife.

"We have more than 40 fish species in the river. This summer we've also been noting muskrats, deer, turtles, frogs, blue heron, mallard ducks and Canada geese," Lawrence said. "This is a living river, a natural corridor that we're lucky to have on our campus.

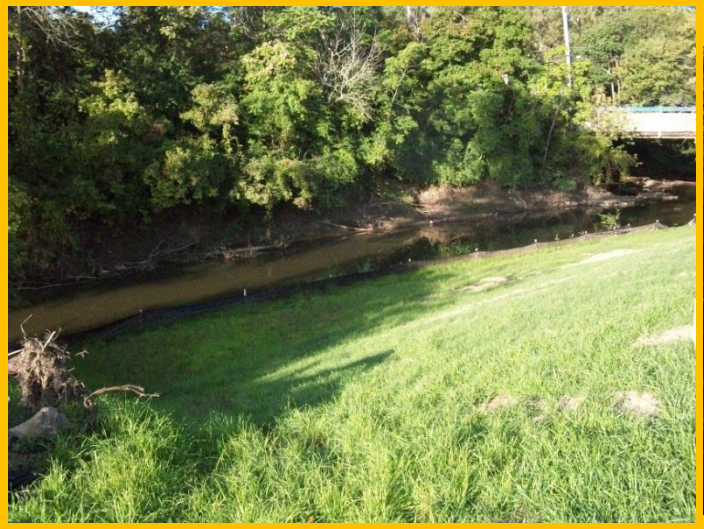
"The Ottawa River has its issues and challenges, but it has a lot of potential if we can improve the aquatic and forest habitat along the 3,700 feet through Main Campus."

Tree removal completed at the cut bank site June 2012 funded by grant from USFWS

Stages of the Construction of the Cutbank (June to August 2012) photos below



Approximately 4,700 cubic yards of concrete fill (placed in late 1950s) was removed, screened on site with all concrete, woody debris recycled; clean sediment reused on site as topsoil

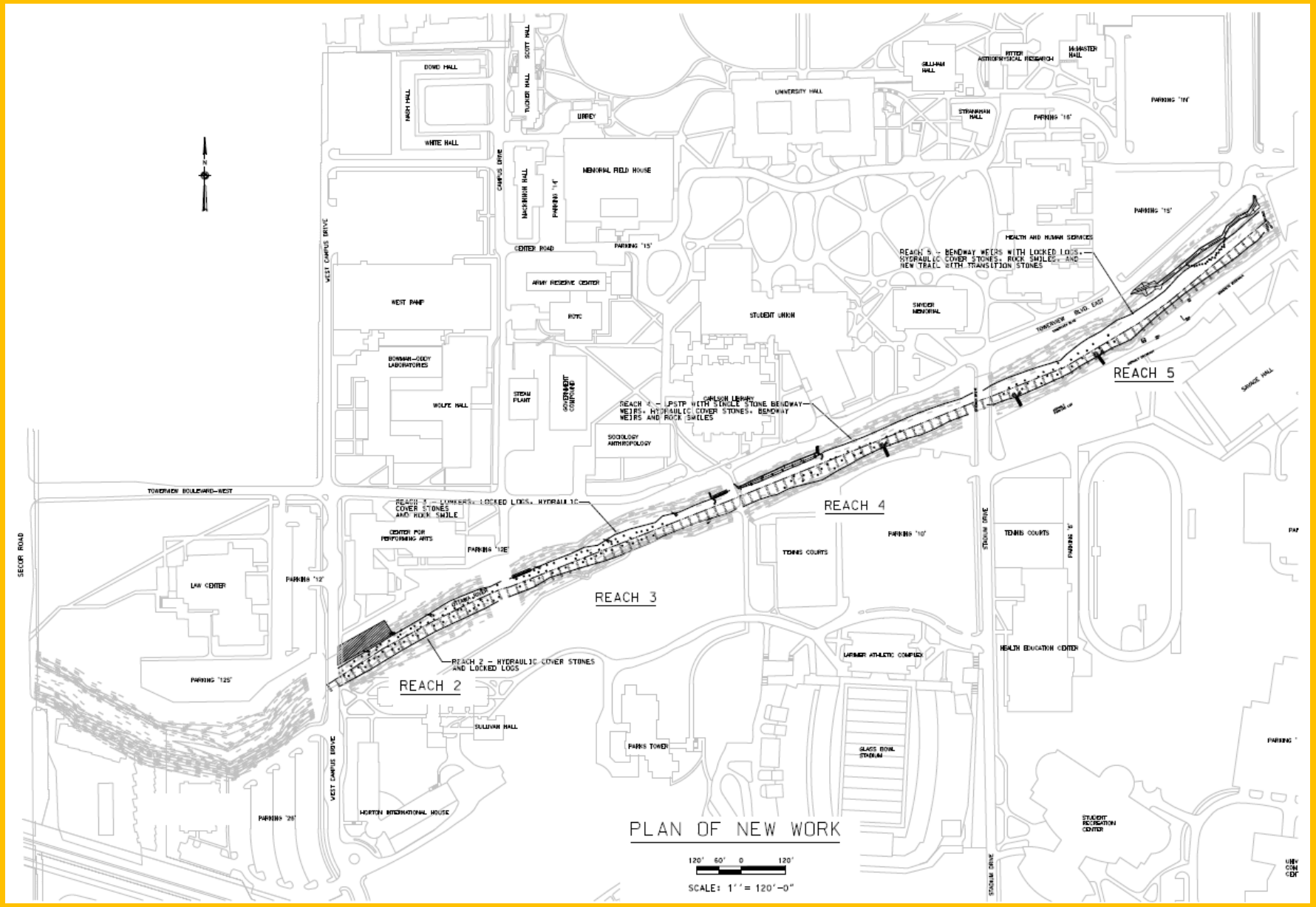


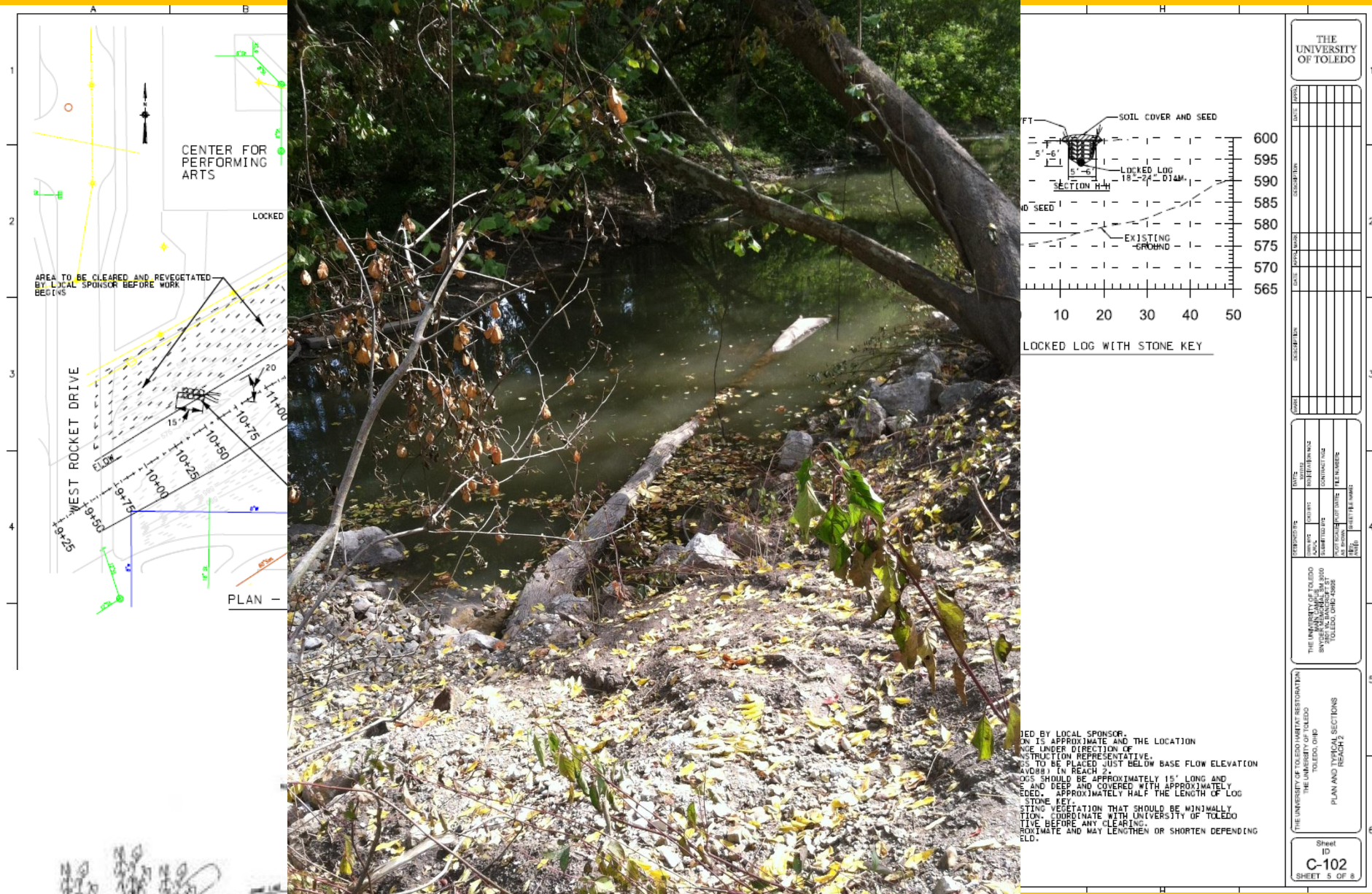
An additional benefit to the project were improvements to two existing stormwater outfalls

On October 1st, 2012 volunteers planted 317 new native trees and shrubs including . Species included Indigo Bush, Chokeberry, Hornbeam, Hackberry, Buttonbush, Redbud, Dogwood, Winterberry, Spicebush, Tulip Poplar, Sycamore, Black Cherry, several Oak species, Sumac, Rose, Sassafras, and Viburnum.

Deer repellent was applied and protective trunk wiring will be installed to prevent deer rub.

Phase II: In-stream Restoration Plans




CENTER FOR PERFORMING ARTS
LOCKED
AREA TO BE CLEARED AND REVEGETATED BY LOCAL SPONSOR BEFORE WORK BEGINS
WEST ROCKET DRIVE
FLOW
PLAN
SOIL COVER AND SEED
5'-6'
LOCKED LOG 18"-24" DIAM.
SECTION H-H
EXISTING GROUND
600
595
590
585
580
575
570
565
10
20
30
40
50
LOCKED LOG WITH STONE KEY
THE UNIVERSITY OF TOLEDO
THE UNIVERSITY OF TOLEDO HABITAT RESTORATION
PLAN AND TYPICAL SECTIONS
REACH 2
Sheet ID
C-102
SHEET 5 OF 8

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THE UNIVERSITY OF TOLEDO

Public Meeting

University of Toledo
Ottawa River Restoration Project
Phase II: In-Stream Restoration

Tuesday October 30th

4:00 – 6:00 pm

Snyder Memorial 3066

Drinks and light refreshments provided

Parking available in Lot 10

For more information please contact:

Dr. Patrick Lawrence

Chair, UT Presidents Commission on the River

(patrick.lawrence@utoledo.edu)

Appreciation is extended to all the project partners and funders:

Ohio EPA

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

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