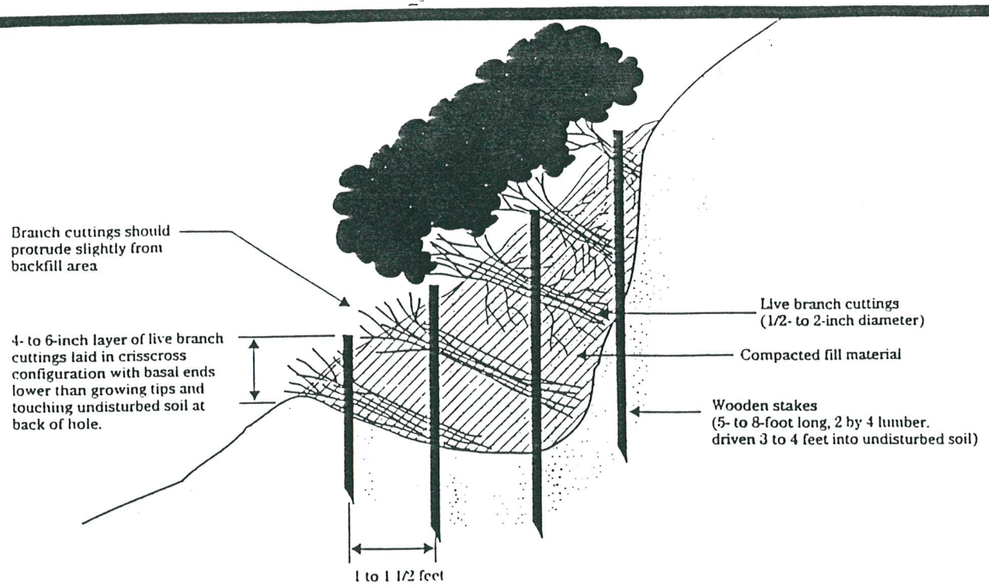
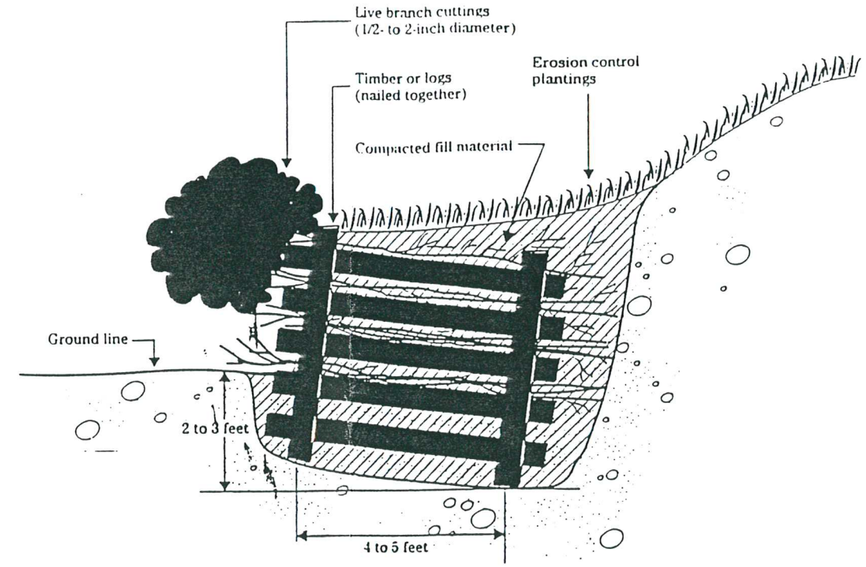
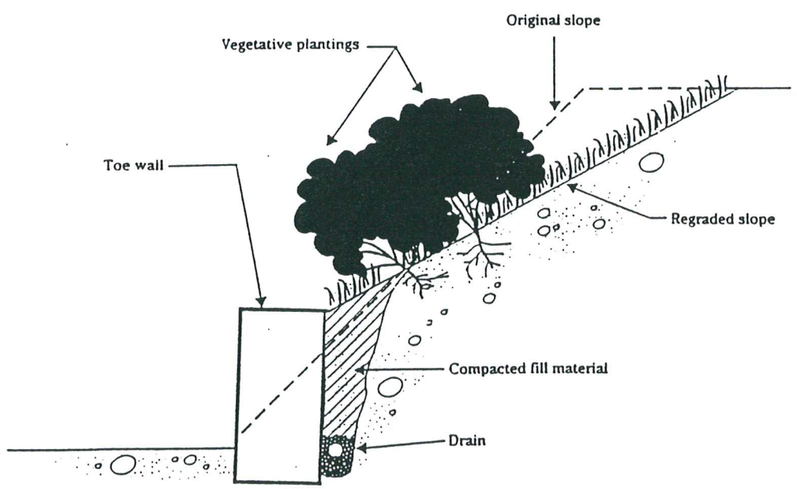


BRANCH PACKING

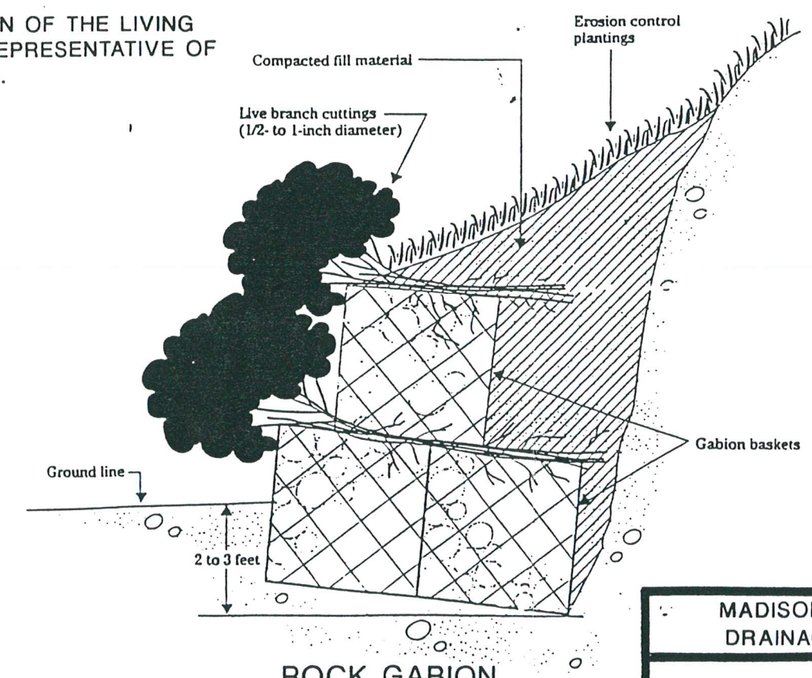


CRIBWALL

NOTE:
ROOTED/LEAFED CONDITION OF THE LIVING PLANT MATERIAL IS NOT REPRESENTATIVE OF THE TIME OF INSTALLATION.



RETAINING WALL



ROCK GABION

MADISON/LAKE COUNTY DRAINAGE BASIN STUDY

BANK STABILIZATION

FIGURE NO. 21

L. Lake Outlet Evaluation

1. Lake Herman: The widening of Lake Herman outlet will result in more storm water entering the City of Madison during the 100-year storm frequency. The computer modeling of Silver Creek, as well as the July 3, 1993 flood, indicates that Silver Creek channel is not capable of handling additional storm water. Therefore, widening the outlet at Lake Herman would result in greater property damage within the City of Madison than was experienced during the July 3, 1993 flood.

The water level in Lake Herman during the July 3, 1993 flood inundated several homes, a resort, the State Park and over-topped the east road around the Lake. Therefore, making the outlet smaller would not result in much of a change in lake level because the road controlled the lake level.

One alternative evaluated was raising Territorial Road to elevation 1675. The current low spot in the road is near the state park with an elevation of approximately 1672.5. The higher road surface would control the 100-year flood event and would not be overtopped. The water surface in Lake Herman would raise approximately 0.7 feet. Raising the road would protect the residents on the east side of the road, but compounds the problem for residents along the southwest and west side of the Lake. A higher lake level would also impact the State Park.

Silver Creek will still flood with the higher road surface along Lake Herman because the peak flow going through town is generated by the area between Lake Herman and the confluence with Park Creek. However this flood peak will go up and down in four hours.

It is recommended that the width of Lake Herman outlet remain unchanged. Consideration should be given to raising the road surface. The cost of raising the road would be approximately

$300,000, which does not include the cost for buyout and relocation of homes affected by the higher water surface.

2. Lake Madison: The outlet of Lake Madison was modeled with a modified outlet. The box culvert in the road down stream of the outlet would also have to be modified to realize any benefit to outlet changes. Modifying the size of the outlet from 48′ to 150′ and doubling the box culvert from 3 cells to 6 cells would only drop the water surface 0.1 feet. The widening of Lake Madison outlet without any of the other improvements will result in storm water entering Brant Lake at a faster rate during the 100-year storm frequency. The wider outlet on Lake Madison, would increase the water surface elevation at Brant Lake and cause additional property damage. Therefore there is little benefit to widening the outlet without other modification.

The water level in Lake Madison during the July 3, 1993 flood inundated several homes, a resort, and over-topped roads. Therefore, making the outlet smaller would result in a higher lake level and compound the problem experienced in 1993.

3. Brant Lake: The widening of Brant Lake outlet without any other improvements will result in water entering Skunk Creek at a faster rate during the 100-year storm frequency. A wider outlet on Brant Lake, would increase the peak flow downstream of Brant Lake and affects of which are not a part of this work.

The high water level in Brant Lake during the July 3, 1993 flood resulted in property damage. Therefore, making the outlet smaller would result in a higher lake level and compound the problem experienced in 1993.

4. Summary of Lake Outlet Modifications: Modification of any of the lake outlets individually will not produce beneficial results. However if the detention dams are constructed north of Madison and the proposed modifications are made at each lake there will be

reduction in water surface elevations and outflow at Lake Madison and Brant Lake. Shown below is a summary table of the resulting water surface at each lake based on various proposed modification.

	Lake Herman Elev.	Q-Out (cfs)	Lake Madison Elev.	Q-Out (cfs)	Brant Lake Elev.	Q-Out (cfs)
Baseline for 100-year storm	1673.72	2020	1605.62	2407	1600.40	1489
Modify Brant Lake Outlet	1673.72	2020	1605.62	2407	1599.68	1793
Modify Lake Madison Outlet	1673.72	2020	1605.48	2567	1600.58	1643
Raise Road along L. Herman	1674.36	574	1605.58	2268	1599.92	1122
Detention Dams no Outlet Mod.	1673.72	2020	1605.38	1647	1599.89	1106
D. Dams & Outlet Mod. Mad. & Brnt	1673.72	2020	1605.18	1731	1599.30	1457
D. Dams & All Outlet Modify	1674.36	574	1604.94	1256	1598.90	1099

The Detention dams north of Madison will reduce Lake Madison water surface elevation by 0.24 feet and Brant Lake water surface will drop by 0.51 feet. The water surface elevation at Lake Herman will not be affected because it is not in the same watershed as the proposed detention dams. The greatest impact of the detention dams will be on the lake outflow. The outflow from Lake Madison will be reduced by 760 cfs and the outflow from Brant Lake will be reduced by 383 cfs as shown in the table above. Therefore, construction of the detention dams north of Madison will benefit the developments around Lake Madison and Brant Lake.

Construction of the detention dams in combination with modification of the outlets will have a greater benefit than the detention dams alone. Lake Madison water surface will drop 0.44 feet and Brant Lake water surface will drop 1.1 feet. Lake Herman will remain unchanged. The outflow from Lake Madison will drop 676 cfs and the outflow from Brant Lake will drop 32 cfs as shown in the table above. Therefore, construction of the detention dams north of Madison and modification of the outlets will have a greater impact on the water surface elevations and a smaller impact on the outflow because of the larger outlets.

Construction of the detention dams, modification of the outlets on Lake Madison and Brant Lake along with raising the road along Lake Herman will provide the greatest benefit to the City of Madison and residents around Lake Madison and Brant Lake. Residents around Lake Herman will be negatively impacted by the proposed improvements. The water surface of Lake Herman will rise approximately 0.64 feet. Lake Madison water surface will drop 0.68 feet and Brant Lake water surface will drop 1.5 feet. The outflow from Lake Herman,Lake Madison and Brant Lake will drop 1446 cfs, 1151 cfs and 390 cfs respectively. Therefore, construction of the detention dams north of Madison, modification of the outlets and raising the road along Lake Herman will have the greatest impact on the water surface elevations and the outflow because of the added impoundment volume provided by Lake Herman.

A Flood Control Permit must be obtained from the Water Management Board prior to any construction around the Lakes. The Water Management Board would hold Public Hearings to allow public input into any proposed project. The request for the permit must show that the proposed construction is not merely moving the flooding problem from one location to another or trading one set of problems for another.

VII. COMPREHENSIVE PLAN DEVELOPMENT:

A. General: The improvements as evaluated in Section VI, Evaluation of Proposed Alternatives, were screened for each sub-basin. This process resulted in several alternatives which will reduce the flooding potential. Based on the screening process and the identified flood problems, two alternative comprehensive plans were developed. These plans represent practical, cost-effective alternatives for further analysis.

B. Comprehensive Plan No. 1:

1. Project 1: Construct Detention Dam upstream of Madison on Park Creek. The detention dam north of Madison would be approximately 32′ high and would pond water up to elevation 1701 during the 100-year flood. The dam would be constructed with earth and roller compacted concrete. The dam would also be constructed with three 48" outlet pipes with gate controls in the low flow channel. This detention dam will decrease the peak flood flow from 4340 cfs to 330 cfs at the north City Limits.

The Opinion of Probable Project Cost for Project 1 is summarized as follows:

Construction Cost	$1,106,000
Contingencies	$ 166,000
Geotechnical	$ 12,000
Engineering	$ 200,000
Administration	$ 10,000
Land Acquisition	$ 256,000
Opinion of Probable Total Project Cost	$1,750,000

2. Project 2: Construct Detention Pond west of US Highway 81 on Park Creek Tributary on the northwest side of Madison. This detention pond would be created by extending the existing twin 54-inch culverts to the west of Highway 81 along with a

berm over the culvert extension. The twin 54-inch culverts would terminate in a control weir structure. The control weir structure would have a 36" diameter low flow pipe to dewater the detention pond. The top of the concrete weir wall would be constructed approximately 1 to 2 feet below the Highway 81 grade such that a 100-year storm event would be routed over the weir wall and through the twin 54-inch culverts before over-topping Highway 81. This detention pond would store approximately 192 acre-feet of water. The construction of both detention dams would decrease the flow at the confluence of Park Creek and Park Creek Tributary from 4560 cfs to 915 cfs. The Opinion of Probable Project Cost for Project 2 is summarized as follows:

Construction Cost	$ 60,000
Contingencies	$ 8,000
Engineering	$ 11,000
Administration	$ 1,000
Land Acquisition	$ 24,000
Opinion of Probable Project Cost	$104,000

3. Project 3: This project consists of upsizing or modifying the following drainage structures:

Park Creek

- Fourth Street SE box culvert
- Railroad Bridge; vertical concrete wingwalls & abutments,
- Garfield Avenue Bridge
- Grant Avenue Bridge
- Clean and Grade Stream channel to provide a more efficient channel.

Park Creek Tributary

- Josephine Avenue, construct one additional arch pipe

Silver Creek

- Washington Avenue box culvert
- Lower gravel road and replace box culverts just east of the

dredged sludge holding ponds

- Clean and Grade Stream channel to provide a more efficient channel.

The Opinion of Probable Project Cost for Project 3 is summarized as follows:

Construction Cost	$1,371,000
Contingencies	$ 205,000
Engineering	$ 246,000
Administration	$ 14,000
Opinion of Probable Total Project Cost	$1,836,000

Summary of Comprehensive Plan No. 1 Project Costs is presented in the following table:

Project No.	Opinion of Probable Project Cost
1	$1,750,000
2	104,000
3	1,836,000
Total Comprehensive Plan No. 1	$3,690,000

The resulting 100 year and 25 year floodway boundary for constructing Project No. 1 is shown on Figure 22, Project No. 1, One Detention Pond.

The resulting 100 year and 25 year floodway boundary for constructing Project No. 2 in combination with Project No. 1 is shown on Figure 23, Project No. 2, Two Detention Ponds.

The resulting 100 year and 25 year floodway boundary for constructing Project No. 3 in combination with Projects 1 and 2 is shown on Figure 24, Project No. 3, Two Detention Ponds with Drainage Structures Modifications.