Green Lake County
Drainage Board

P.O. Box 3188
Green Lake, WI 54941-3188

Thomas Dolata - 920-361-2915
Patrick Krueger - 920-361-2129
Dick Severson - 920-398-2857

Drainage Board
Meeting Notice

Date: January 6, 2016 Time: 7:00 p.m.
Training Room, Green Lake County Government Center
571 County Rd A, Green Lake WI

AGENDA

Committee Members

Patrick Krueger, Chair
Thomas Dolata, Vice-Chair
Dick Severson, Secretary

1. Call to Order
2. Certification of Open Meeting Law
3. Pledge of Allegiance
4. Approval of Agenda
5. Approval of December 2, 2015 & December 11, 2015 Minutes
6. Public Comment (3 min limit)
7. Appearances – DNR Staff to answer questions on Sucker Creek
8. Seneca-Warren Drainage District
   a. Sucker Creek/Lateral A
   b. Survey Lateral A to Hwy D
   c. Gneiser Request
   d. Gonyo Request
   e. Brush Cutting.
   f. Loan repayment
9. Mashuda Dissolution Request
10. Culvert Replacement Hwy U, Drainage District 3
11. Vouchers
12. Correspondence
13. Committee Discussion
    - Future Meeting Date (Tuesday, February 2, 2016)
    - Future Agenda Items for Action & Discussion
14. Adjourn

Kindly arrange to be present, if unable to do so, please notify the Land Conservation office at 920-294-4051.
Sincerely, Patrick Krueger, Drainage Board Chairman

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Drainage Board
December 2, 2015
7:00 P.M. – 8:37 P.M.
Training Room
571 County Road A
Green Lake, WI

Call to Order: The meeting of the Drainage Board was called to order by Chairman Krueger. The requirements of the open meeting law were certified as being met. The Pledge of Allegiance was recited.

Present: Patrick Krueger, Chair
Thomas Dolata, Vice-Chair
Dick Severson, Secretary

Also Present: Richard M. Sobieski, Scot Harenburg, Pat Gonyo, Joe Gonyo, Dave Gneiser, Lavern Alf, Joan Alf, Bob Alf and Todd Morris – Green Lake County Land Conservation Department.

Agenda: ***Motion/second (Dolata/Severson)*** to approve the agenda as presented. Motion carried.

Minutes: ***Motion/second (Severson/Dolata)*** to approve the November 3, 2015 meeting minutes as presented. Motion carried.

Public Comments: none

Appearances: Scot Harenburg stated that the ditch is flooding his property and he had pictures of property that showed this. Pictures were shown to the board. Harenburg is being assessed $4.93/ac for drainage and he has 1 ft of water on his property. Harenburg also stated that the beaver dam at the end is only a pile of sticks. Harenburg wants to be compensated for assessments paid on his property, or he would like the berm between his property and the district drain fixed so water from the ditch does not run on his property. The berm between the district drain and the Harenburg property has about 7 breaches that let water into Harenburg's property. Harenburg estimated that repairs to this berm would be between $20,000 - $40,000. If something is not done he will get a court order. Harenburg would like to be removed from the district due to his land being all wetland. Dolata stated that the water coming down the ditch is not the boards property and that water will seek the lowest point. Harenburg pointed out the double ditch along his property and explained that his land does not even drain to the ditch, but that his water exits his property through private ditches to the Fox River. Sobieski spoke and stated that the low lands landowners should have the same benefit of drainage as the landowners at the upper end of the district. Dolata feels the board needs to address this issue and will have to walk this site with landowner to come up with a solution. Krueger would like to meet with the Green Lake County Land Conservation Department to look at the maps and decide what to do with wetland areas in the lower section of the ditch.

Motion/second (Dolata/Severson) to meet with the Green Lake County Land Conservation Department to look at maps and address wetland areas. Motion carried.

Morris will look at his calendar and schedule a date to meet with the board. Harenburg will be notified of the meeting date.

Correspondence:
U.S. Census Bureau – Census on District 4
MSA Memo regarding Gneiser and Gonyo

Committee Discussion:
Severson reported on the WI Assoc. of Drainage Districts Annual Meeting – Matt Woodrow will be working as the new State Drainage Engineer, everything should be channeled through Chris Clayton, DATCP should be sending drainage boards a To-Do list, there is some grant money available for Water Quality projects.
Morris commented that the Green Lake County Highway Department will be replacing culverts on Hwy U in the Town of Manchester. The culverts area located in Drainage District 3. Morris will be assisting the Highway Department with the calculations for replacement.

Future Meeting Date: The next meeting will be January 6, 2016 at 7:00 P.M. in the Training Room of the Government Center in Green Lake.

Future Agenda Items for Action & Discussion:
- Sucker Creek/Lateral A
- Survey Lateral A to Hwy D
- Gneiser Request
- Gonyo Request
- Brush Cutting
- Mashuda Dissolution Request
- Culvert Replacement – District 3

Adjourn: ***Motion/second (Severson/Dolata)*** to adjourn. Motion carried.

Respectfully submitted, Todd Morris, Recorder

Meeting expenses:				
	Ditch #1	_____	Ditch #5	_____
	Ditch #2	_____	Seneca-Warren	100%
	Ditch #3	_____	General	_____
	Ditch #4	_____		

Green Lake County
Drainage Board

P.O. Box 3188
Green Lake, WI 54941-3188

Thomas Dolata - 920-361-2915
Patrick Krueger - 920-361-2129
Dick Severson - 920-398-2857

Drainage Board
December 11, 2015
9:00 A.M. – 10:51 A.M.
Land Conservation Department
571 County Road A
Green Lake, WI

Call to Order: The meeting of the Drainage Board was called to order by Chairman Krueger. The requirements of the open meeting law were certified as being met.

Present: Patrick Krueger, Chair
Thomas Dolata, Vice-Chair
Dick Severson, Secretary

Also Present: Scott Harenburg, Todd Morris – Green Lake County Land Conservation Department

Agenda: ***Motion/second (Severson/Dolata)*** to approve the agenda as presented. Motion carried.

Meet to look at wetland maps of the district and discuss and take action on assessment to wetland acreage for Harenburg and Gonyo properties: Mr. Harenburg feels that his assessment is too high for the benefit that he is receiveing. His assessment is $1476.51 and his property has water on it. Harenburg would be satisfied with a $0.50/acre assessment which would bring his total assessment to around $150.00. Dolata stated that these concerns need to be addressed on a case by case basis and also that he feels that the lower (bottom) wetlands need to be looked at but the upper end should not be removed or reduced because their water is flowing from the wetland and down the ditch and they have a benefit. Krueger also feels that the assessments should be lowered on the bottom end of the ditch. Dolata discussed setting an elevation and lowering the assessments below this elevation by using a percent reduction of the current assessment below this elevation and leaving the CN (curve number) as approved.

Motion/second (Severson/Dolata) for a 75% reduction to the current assessment below elevation 756.0 east of Hwy D. Harenburg receives a 10% additional reduction to 85% because access is cut off to his parcel of land and the board requirement to install an access bridge is removed. Reduction is for 2014 and 2015 assessments. Motion carried.

The board discussed the Gonyo property. Krueger spoke with Bill Young, Marion/Warren Drainage Board member, and Young agreed that some of the water in the Gneiser/Gonyo area goes to the north but some also goes to the south. Krueger had shared the revised boundary maps with Mr. Young and he felt the boundary was accurate.

Motion/second (Severson/Dolata) to leave the Gonyo assessment as it was approved at the December 2, 2015 meeting which removed a portion of the property based on the revised watershed boundary submitted by MSA. Motion carried.

Discussion on Gneiser Request: Discussion was the same for Gneiser as Gonyo. After speaking with Mr. Young the board feels that the revised boundary is accurate.

TOWN OF SENECA
c/o W2685 Fox River Shores E
Berlin, WI 54923-8710
920-361-2976
senecatownclerk@yahoo.com

December 2, 2015

Green Lake County Drainage Board
PO Box 3188
Green Lake, WI 54941

To the Drainage Board,

The Town Board of the Town of Seneca of Green Lake County would like an explanation of your protocol for paying a County employee who does work for the Drainage Board.

Respectfully yours,

The Town Board of the Town of Seneca

MSA PROFESSIONAL SERVICES

RECEIVED
DEC 03 2015
GREEN LAKE COUNTY CLERK

INVOICE

Payment due upon receipt of invoice. Interest at the rate of 1.5% per month on unpaid balance will be added to your next statement.

REMIT TO:
MSA Professional Services Inc
PO Box 435
Baraboo WI 53913-0435

Green Lake County
PO Box 3188
Green Lake, WI 54941

November 25, 2015
Project No: R00221009.0
Invoice No: 5
Project Manager: Eric Thompson
Client Liaison: Jason Valerius

Project R00221009.0 Seneca Warren Drainage District Official Profile Investigation

On November 6, MSA was asked to review a request to remove two parcels from the drainage district. MSA completed this evaluation and replied with a technical memorandum to the board which was transmitted by email to Todd Morris on November 23.

Professional Services from November 6, 2015 to November 21, 2015

Professional Personnel

	Hours	Rate	Amount	
Converse, Amber	5.50	96.00	528.00	
Totals	5.50		528.00	
Total Labor				**528.00**
			AMOUNT DUE THIS INVOICE	**$528.00**

~~14~~ 15-803-00-24512-000-000 Seneca District No. 1
Desc MSA Watershed Review
Amount $528.00
Initials/Date TM/12/4/15

Green Lake County

GREEN LAKE COUNTY
Land Conservation Department

571 County Road A
PO Box 3188
Green Lake, WI 54941-3188

Phone: 920-294-4051
FAX: 920-294-4056
Email: lcd@co.green-lake.wi.us

Replacement of Culvert on County Road U

Existing Watershed Conditions:

- Engineering Field Handbook (EFH) 2 was used to calculate the peak discharge for the watershed. The drainage area is 970.6 acres.
- The 100 yr. peak discharge for the watershed is 1042.9 cubic feet per second (cfs). The 2yr peak discharge is 142.1 cfs, and the 10yr peak discharge is 378.4 cfs.
- The culvert replacement will be on County Rd U, in the Town of Manchester, Section 13.
- This culvert replacement is not located on any stream, but it is in Drainage District #3. Plans shall be submitted to the Green Lake County Drainage Board for approval.
- FEMA Floodplain maps show no floodplain associated in the area where the culvert replacement will be located.

Current Culvert Conditions:

- Currently there are 3culverts at the site which measure:
  - 30" x 64' – invert elevation 847.2
  - 48" x 50' – invert elevation 850.1
  - 36" x 35' – invert elevation 853.4.
- The pipe flow formula was used to calculate the discharge through the pipes.
- The calculated combined discharge through the culverts is 255.1 cfs.

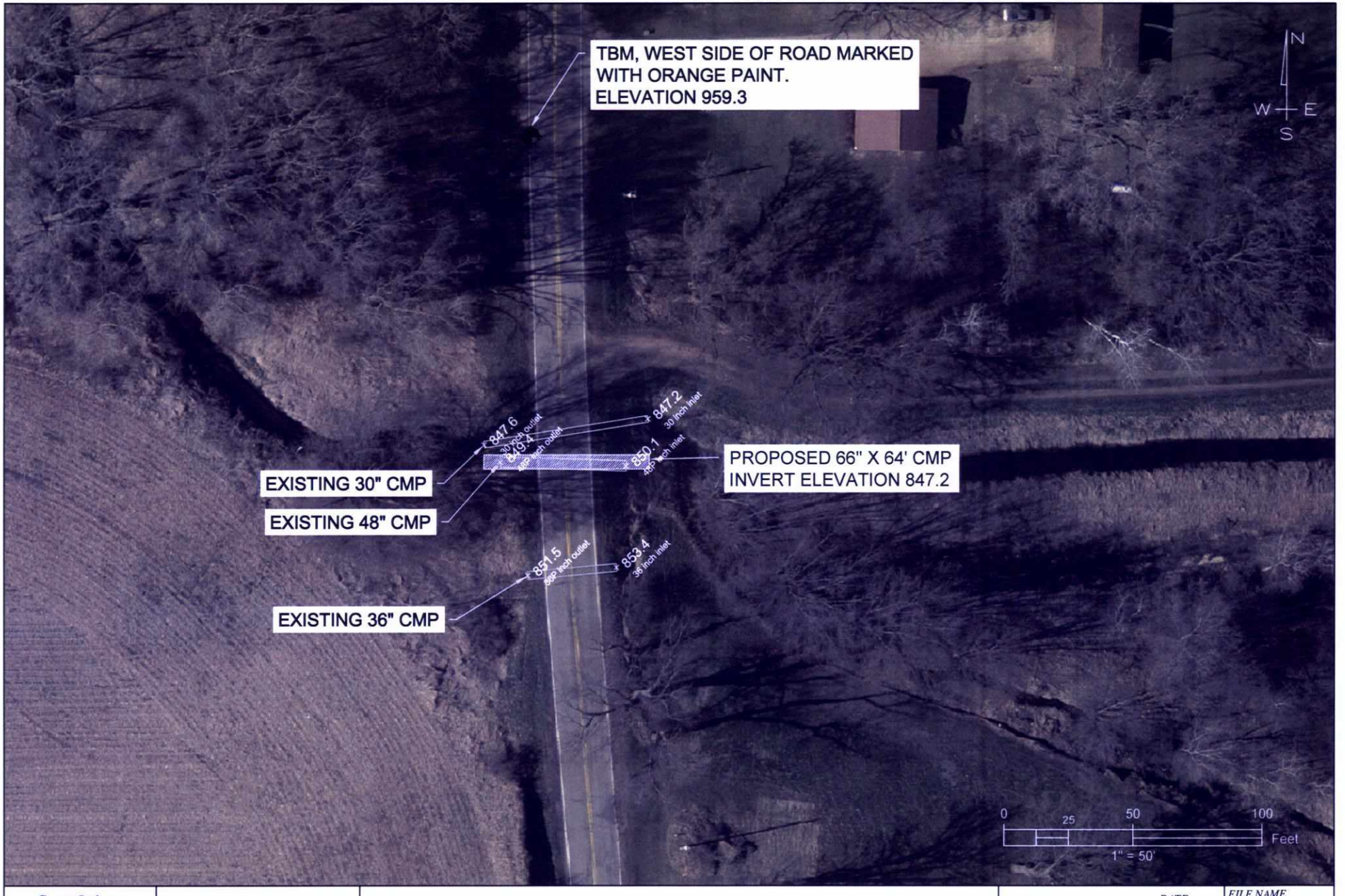
Proposed Culvert Replacement:

- Green Lake County would like to install a round pipe culvert measuring 66" x 64'.
- Based on the pipe flow formula the culvert would discharge 293.3 cfs.
- This culvert would handle the peak discharge from a 5yr-24hr storm event which is 255.3 cfs.

Conclusions:

- The watershed has a 100yr – 24hr storm peak discharge of 1042.9 cfs while the current culverts maximum capacity is 255.1 cfs, therefore the current culvert restrictions were used to size the new culvert.
- The proposed 66" x 64' round culvert would pass 293.3 cfs which is an increase of 38.2 cfs.
- Install the 66" x 64' round culvert at the elevation determined from the Drainage District #3 profile.
- The proposed invert of the culvert would be elevation 847.2 (the current invert of 30" culvert)
- A temporary benchmark has been established on the west side of Hwy U marked with orange paint at elevation 959.3.

See attached documentation



Green Lake County

LCD

GREEN LAKE COUNTY DEPARTMENT OF LAND CONSERVATION

Green Lake County

County Rd. U

DESIGNED: _____ *DATE:*

DRAWN: _____

CHECKED: _____

APPROVED: _____

FILE NAME Cty Rd. U

DRAWING NAME 001

DATE: 11/12/15

SHEET 1 *OF* 1

COMPUTATION SHEET
NRCS-ENG-523 Rev. 10-97
NRCS-ENG-523A Rev. 10-97

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

STATE Wisconsin		PROJECT Culvert Replacements		
BY Todd Merris	DATE 11/12/15	CHECKED BY	DATE	JOB NO.
SUBJECT Green Lake County Highway Dept				SHEET 1 OF

① Existing Culverts:

1 - 30" x 64' Inlet Elev. 847.2 Outlet Elev 847.6

1 - 48" x 50' Inlet Elev. 850.1 Outlet Elev. 849.4

1 - 36" x 35' Inlet Elev. 853.4 Outlet Elev. 851.5

Centerline of Road Height = Elev. 858.8

Survey 2015: Current R/C = 858.8

Culvert Elev Invert = 847.2

Drop from C/L = 11.6 ft

Capacity:

30" Existing = 59 cfs

48" Existing = 137.0 cfs.

36" Existing = 59.1 cfs.

255.1 cfs

Peak Discharge for Watershed:

2yr-24hr Storm = 142.1 cfs

10yr-24hr Storm = 378.4 cfs

100yr-24hr Storm = 1042.9 cfs

Survey 1943

Planned Creek Bottom = 93.8

Centerline of Highway = 104.2

Bottom of Ditch 10.4 ft lower than centerline

Current Centerline Elev = 858.8

- 10.4

Bottom Ditch 848.4

PEAK DISCHARGE, EFH CHAPTER 2 METHOD VER. 12/11/2014

CLIENT: [redacted] COUNTY: [redacted] DATE:
DSN BY: [redacted] CHK BY: DATE:
COMMENTS: [redacted]

Drainage Area	970.6	Acres	970.6
Runoff Curve Number	69		
Watershed Length	[redacted]	Feet	
Watershed Slope	[redacted]	Percent	
Time of Concentration	1.904	Hours	

NOAA Atlas 14 Rainfall Distribution Zone: **MSE3**

Frequency	yr	1	2	5	10	25	50	100
Rainfall, P (24 hour)	in	2.29	2.6	3.19	3.74	4.61	5.36	6.18
Initial Abstraction, Ia	in	0.899	0.899	0.899	0.899	0.899	0.899	0.899
Ia/P ratio		0.393	0.346	0.282	0.240	0.195	0.168	0.145
Unit Peak Discharge, qu	cfs/ac/in	0.2942	0.3134	0.3400	0.3542	0.3647	0.3712	0.3766
Runoff, Q	in	0.3289	0.4671	0.7737	1.1006	1.8787	2.2226	2.8535
Peak Discharge, qp	cfs	**93.9**	**142.1**	**255.3**	**378.4**	**594.2**	**800.8**	**1042.9**

Average slope calculator

Sum of contour lengths within the watershed boundary (feet)	[redacted]
Contour interval (Feet)	
Drainage Area (Acres)	
Avg Slope (percent)	[redacted]

Cover Type	Treatment		Curve Numbers for Hydrologic Soil Type A		B		C		D
CULTIVATED AGRICULTURAL LANDS		hydrologic condition							
Fallow	Bare soil	----		77		86		91	94
	Crop residue (CR)	poor		76		85		90	93
	Crop residue (CR)	good		74		83		88	90
Row Crops	Straight row (SR)	poor		72		81		88	91
	Straight row (SR)	good		67		78		85	89
	SR + Crop residue	poor		71		80		87	90
	SR + Crop residue	good	290.9	64	426.3	75	5.3	82	85
	Contoured (C)	poor		70		79		84	88
	Contoured (C)	good		65		75		82	86
	C + Crop residue	poor		69		78		83	87
	C + Crop residue	good		64		74		81	85
	Cont & terraced(C&T)	poor		66		74		80	82
	Cont & terraced(C&T)	good		62		71		78	81
	C&T + Crop residue	poor		65		73		79	81
	C&T + Crop residue	good		61		70		77	80
Small Grain	Straight row (SR)	poor		65		76		84	88
	Straight row (SR)	good		63		75		83	87
	SR + Crop residue	poor		64		75		83	86
	SR + Crop residue	good		60		72		80	84
FINISHED	Contoured (C)	poor		63		74		82	85
	Contoured (C)	good		61		73		81	84
	C + Crop residue	poor		62		73		81	84
	C + Crop residue	good		60		72		80	83
	Cont & terraced(C&T)	poor		61		72		79	82
	Cont & terraces(C&T)	good		59		70		78	81
	C&T + Crop residue	poor		60		71		78	81
	C&T + Crop residue	good		58		69		77	80
Close-seeded	Straight row	poor		66		77		85	89
or broadcast	Straight row	good		58		72		81	85
legumes or	Contoured	poor		64		75		83	85
rotation	Contoured	good		55		69		78	83
meadow	Cont & terraced	poor		63		73		80	83
	Cont & terraced	good		51		67		76	80
OTHER AGRICULTURAL LANDS									
	Pasture, grassland or range	poor		68		79		86	89
		fair		49		69		79	84
		good		39		61		74	80
	Meadow -cont. grass (non grazed)	----	30.8	30	74.7	58	22.3	71	78
	Brush - brush, weed, grass mix	poor		48		67		77	83
		fair		35		56		70	77
		good		30		48		65	73
FINISHED	Woods - grass combination	poor		57		73		82	86
		fair		43		65		76	82
		good	16.3	32	19.6	58		72	79
	Woods	poor		45		66		77	83
		fair		36		60		73	79
		good		30		55		70	77
	Farmsteads	----		59	5	74		82	0.7 86
FULLY DEVELOPED URBAN AREAS (Veg Established)									
Open space (Lawns,parks etc.)									
	Poor condition; grass cover < 50%			68		79		86	89
	Fair condition; grass cover 50% to 75 %			49		69		79	84
	Good condition; grass cover > 75%			39		61		74	80
Impervious Areas									
	Paved parking lots, roofs, driveways			98		98		98	98
	Streets and roads								
	Paved; curbs and storm sewers			98		98		98	98
	Paved; open ditches (w/right-of-way)		6	83	65	89	0.1	92	93
	Gravel (w/ right-of-way)			76		85		89	91
FINISHED	Dirt (w/ right-of-way)			72		82		87	89
Urban Districts		Avg % impervious							
	Commercial & business	85		89	7.6	92		94	95
	Industrial	72		81		88		91	93
Residential districts by average lot size		Avg % impervious							
	1/8 acre (town houses)	65		77		85		90	92
	1/4 acre	38		61		75		83	87
	1/3 acre	30		57		72		81	86
	1/2 acre	25		54		70		80	85
	1 acre	20		51		68		79	84
	2 acre	12		46		65		77	82
	User defined urban			**		**		**	**
DEVELOPING URBAN AREA (No Vegetation)									
	Newly graded area (pervious only)			77		86		91	94

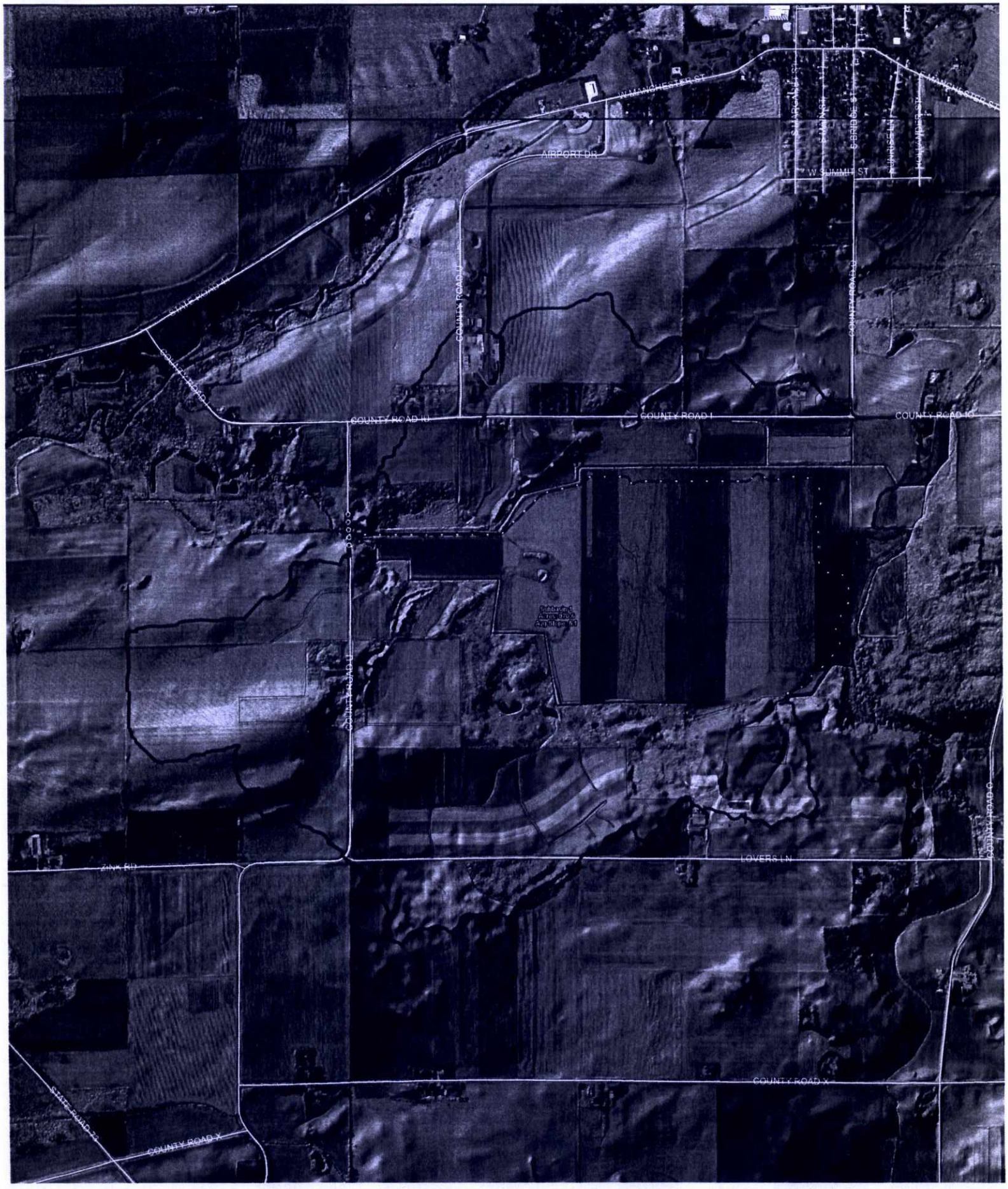
Client: Green Lake County
Date: 1/0/1900

344 598.2 27.7 0.7

Total Acres	970.6
RCN	69

Owner: County Rd. U
County: Green Lake
Approximate Acres:
Plan Identification: Farmland Preservation
Assisted By: Todd Morris, Soil Conservationist Green Lake County Land Conservation

Operator:
State: WI Date: 10/23/2015
Approximate Scale: 1 inch = 1,460 feet
Township & Section: Town of Manchester



Table

Hwy_U_RCN

OBJECTID *	Shape *	SUB_BASIN	LANDUSE	CONDITION	HYDROLGROUP	RCN	ACRES	Shape_Length	Shape_Area
9	Polygon	1	Farmstead		B	74	5.028493	2854.033944	219041.175439
10	Polygon	1	Farmstead		D	86	0.69765	879.203584	30389.65137
5	Polygon	1	Meadow or Continuous Grass Not Grazed Generally Hayed	Good	A	30	0.041944	241.879977	1827.063368
6	Polygon	1	Meadow or Continuous Grass Not Grazed Generally Hayed	Good	B	58	1.455937	3464.534367	63420.613703
11	Polygon	1	Roads Paved with Open Ditches (Including Right of Way)		A	83	6.044875	4756.147319	263314.743571
12	Polygon	1	Roads Paved with Open Ditches (Including Right of Way)		B	89	64.955881	37732.060879	2829478.189167
13	Polygon	1	Roads Paved with Open Ditches (Including Right of Way)		C	92	0.101397	477.502481	4416.872948
1	Polygon	1	Row Crops Straight Row with Crop Residue (SR + CR)	Good	A	64	290.900376	50470.875134	12671620.38437
2	Polygon	1	Row Crops Straight Row with Crop Residue (SR + CR)	Good	B	75	426.244423	105450.86027	18567207.068568
3	Polygon	1	Row Crops Straight Row with Crop Residue (SR + CR)	Good	C	82	5.322601	5468.163625	231852.502436
4	Polygon	1	Row Crops Straight Row with Crop Residue (SR + CR)	Good	D	85	0.001732	37.480684	75.443766
14	Polygon	1	Urban Districts Commercial and Business		B	92	7.646657	2534.88987	333088.392722
15	Polygon	1	Wetland - Vegetated		A	78	30.789951	28647.429707	1341210.245623
16	Polygon	1	Wetland - Vegetated		B	78	73.193641	44123.795302	3188314.995667
17	Polygon	1	Wetland - Vegetated		C	78	22.283199	13236.37679	970656.139386
7	Polygon	1	Woods Grass Combination (Orchard or Tree Farm)	Good	A	32	16.339751	20734.926852	711759.545198
8	Polygon	1	Woods Grass Combination (Orchard or Tree Farm)	Good	B	58	19.586505	18614.76072	853188.170323

0 (0 out of 17 Selected)

Hwy_U_RCN

Table

Hwy_U_FlowPaths

OBJECTID *	Shape *	Shape_Length	Subbasin	Reach	Type	Length_ft
1	Polyline	9240.817411	1	1	Natural Watercourse	9240.817411

1 (0 out of 1 Selected)

Hwy_U_FlowPaths

Table

Hwy_U

OBJECTID *	Shape *	Shape_Length	Shape_Area	Subbasin	Acres	Avg_Slope	RCN
1	Polygon	35227.8392	42280861.197635	1	970.635014	5.097827	72

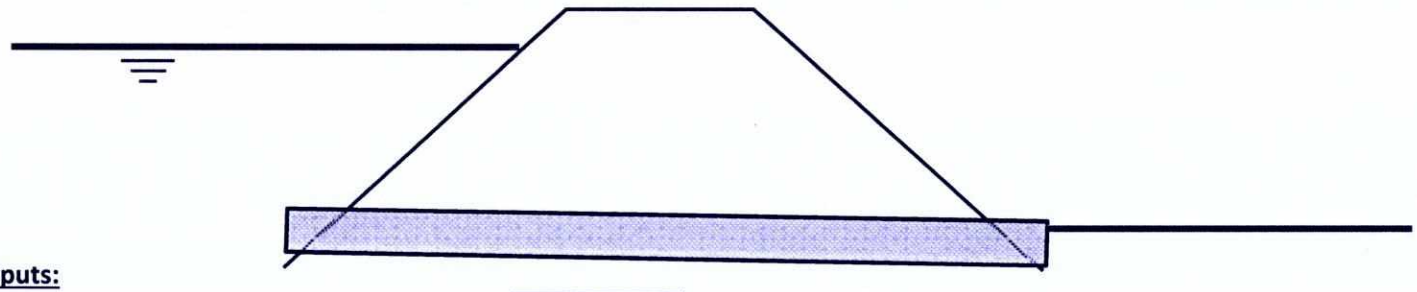
1 (0 out of 1 Selected)

Hwy_U_FlowPaths Hwy_U

Culvert Analysis Spreadsheet

Ver 5/2012

Client:	Green Lake County	County:	Green Lake	Date:	11/12/2015
Design By:	Todd Morris	Checked By:		Date:	
Comments:	Existing 30" CMP Culvert - Hwy U				



Inputs:

Headwater (Upstream Water Surface) Elevation:	858.80	Feet
Culvert Inlet Invert Elevation:	847.60	Feet
Culvert Diameter:	30.00	Inches
Length of Culvert:	64.00	Feet
Culvert Outlet Invert Elevation:	847.60	Feet
Tailwater (Downstream) Elevation:	845.60	Feet

Select Culvert Material:	CMP
Select Culvert Inlet Type:	Projecting - Thin Edge

Outputs:

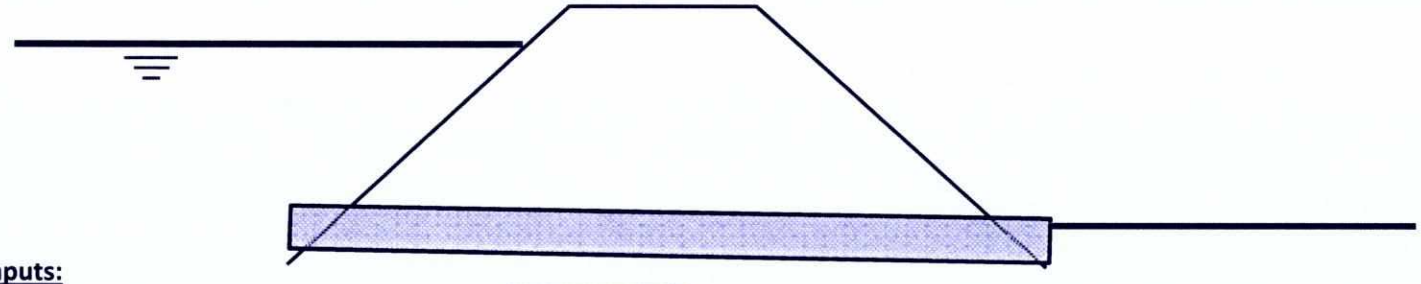
CAPACITY = 59.0 cfs **OUTLET CONTROLS - "Part Full" Equations Used**

Manning's n value:	0.024	CMP
Entrance Coefficient, Ke:	0.9	Projecting - Thin Edge

Culvert Analysis Spreadsheet

Ver 5/2012

Client:	Green Lake County	County:	Green Lake	Date:	11/12/2015
Design By:	Todd Morris	Checked By:		Date:	
Comments:	Existing 48" CMP Culvert - Hwy U				



Inputs:

Headwater (Upstream Water Surface) Elevation:	858.80	Feet
Culvert Inlet Invert Elevation:	850.10	Feet
Culvert Diameter:	48.00	Inches
Length of Culvert:	50.00	Feet
Culvert Outlet Invert Elevation:	849.40	Feet
Tailwater (Downstream) Elevation:	845.60	Feet

Select Culvert Material:	CMP
Select Culvert Inlet Type:	Projecting - Thin Edge

Outputs:

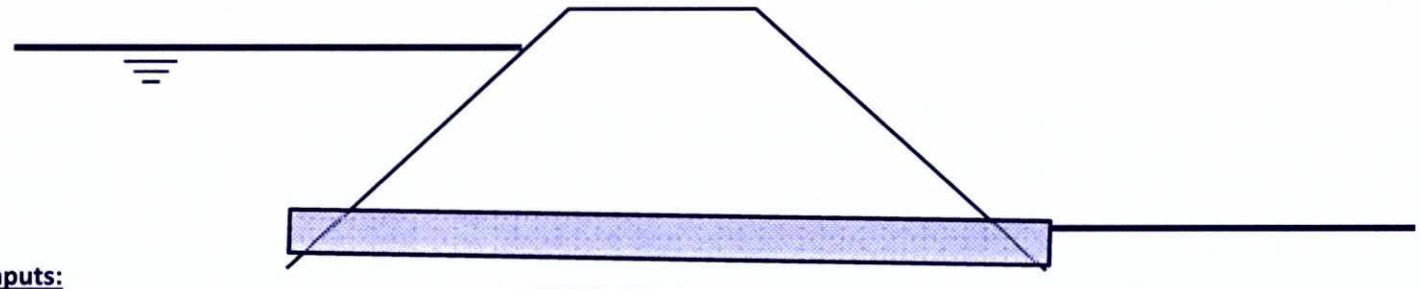
CAPACITY = 137.0 cfs **INLET CONTROLS (Submerged Equation)**

Manning's n value:	0.024	CMP
Entrance Coefficient, Ke:	0.9	Projecting - Thin Edge

Culvert Analysis Spreadsheet

Ver 5/2012

Client:	Green Lake County	County:	Green Lake	Date:	11/12/2015
Design By:	Todd Morris	Checked By:		Date:	
Comments:	Existing 36" CMP Culvert - Hwy U				



Inputs:

Headwater (Upstream Water Surface) Elevation:	858.80	Feet
Culvert Inlet Invert Elevation:	853.40	Feet
Culvert Diameter:	36.00	Inches
Length of Culvert:	35.00	Feet
Culvert Outlet Invert Elevation:	851.50	Feet
Tailwater (Downstream) Elevation:	845.60	Feet

Select Culvert Material:	CMP
Select Culvert Inlet Type:	Projecting - Thin Edge

Outputs:

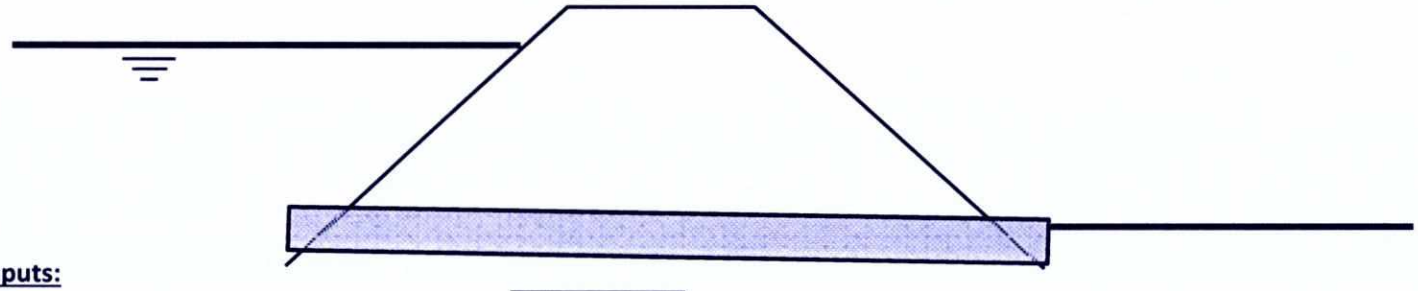
CAPACITY = 59.1 cfs **INLET CONTROLS (Submerged Equation)**

Manning's n value:	0.024	CMP
Entrance Coefficient, Ke:	0.9	Projecting - Thin Edge

Culvert Analysis Spreadsheet

Ver 5/2012

Client:	Green Lake County	County:	Green Lake	Date:	11/12/2015
Design By:	Todd Morris	Checked By:		Date:	
Comments:	Proposed 66" CMP Culvert - Hwy U				



Inputs:

Headwater (Upstream Water Surface) Elevation:	858.80	Feet
Culvert Inlet Invert Elevation:	847.60	Feet
Culvert Diameter:	66.00	Inches
Length of Culvert:	64.00	Feet
Culvert Outlet Invert Elevation:	847.30	Feet
Tailwater (Downstream) Elevation:	845.60	Feet

Select Culvert Material:	CMP
Select Culvert Inlet Type:	Miter/Square/2:1 Slope

Outputs:

CAPACITY = 293.3 cfs **INLET CONTROLS (Submerged Equation)**

Manning's n value:	0.024	CMP
Entrance Coefficient, Ke:	0.7	Miter/Square/2:1 Slope

FILL HEIGHT TABLE 4 - - Corrugated Steel Pipe Arch - 2_" x ½" Corrugations - H20 Live Load

Size Span x Rise Inches	Min. Thickness In. (1)	Min. Cover In. (2)	Max. Height of Fill Ft. (3)	Waterway Area Sq. Ft.	Round Pipe of Equal Periphery	
					Waterway Area Sq. Ft.	Dia. Inches
17 X 13	0.064	18	13	1.1	1.23	15
21 x 15	0.064	18	12	1.6	1.77	18
24 x 18	0.064	18	10	2.2	2.41	21
28 x 20	0.064	18	9	2.8	3.14	24
35 x 24	0.079	18	9	4.4	4.91	30
42 x 29	0.079	18	7	6.4	7.07	36
49 x 33	0.109	18	7	8.7	9.62	42
57 x 38	0.109	18	7	11.4	12.57	48
64 x 43	0.109	18	7	14.3	15.90	54
71 x 47	0.138	18	7	17.6	19.64	60
77 x 52	0.168	18	7	21.3	23.76	66
83 x 57	0.168	18	8	25.3	28.27	72

FILL HEIGHT TABLE 5 - - Corrugated Steel Pipe Arch (4) - 3" x 1" Corrugations - H20 Live Load

Size Span x Rise Inches	Min. Thickness In. (1)	Min. Cover In. (2)	Max. Height of Fill Ft. (3)	Waterway Area Sq. Ft.	Round Pipe of Equal Periphery	
					Waterway Area Sq. Ft.	Dia. Inches
40 x 31	0.064	18	12	6.4	7.07	36
46 x 36	0.064	18	12	8.7	9.62	42
53 x 41	0.064	18	12	11.4	12.57	48
60 x 46	0.064	18	12	14.3	15.90	54
66 x 51	0.064	18	12	17.6	19.64	60
73 x 55	0.064	18	15	22.0	23.76	66
81 x 59	0.079	18	15	26.0	28.27	72
87 x 63	0.079	18	14	31.0	33.18	78
95 x 67	0.109	18	12	35.0	38.48	84
103 x 71	0.109	24	11	40.0	44.18	90
112 x 75	0.109	24	10	46.0	50.27	96
117 x 79	0.109	24	10	52.0	56.74	102
128 x 83	0.138	24	9	58.0	63.62	108

(1) The steel thicknesses shown are adequate for structural requirements only. Where corrosive and/or abrasive conditions exist, greater thicknesses should be specified.
(2) Minimum cover top of pipe to top of subgrade.
(3) Allowable fill heights are computed on the basis that corner bearing pressure will **not exceed** two tons per square foot.
(4) Table 5 is also valid for the metric 125 mm x 25 mm corrugation which may be used in lieu of the 3" x 1" corrugations.