

See B-70-307 & B-70-244
for additional H & H documentation
WisDOT HYDRAULIC BRIDGE DESIGN

USH 45 East Frontage Rd over Arrowhead R.

BRIDGE NUMBER: B-70-308
QUAD MAP #: Oshkosh NW, R-8a

HYDRAULICS BY: NK
DATE: 3-9-2010
FHA X (Y) (N)
Zone A

HYDROLOGY

Q100= 3000 cfs
Q2= 760 cfs
DRAINAGE AREA= 26.8 sq mi

BY: NK
DATE: 5-4-05

METHOD: Regression Equations & Basin Comparison
See B-70-244 for Calculations

HYDRAULICS

METHOD: (WSPRO, HEC-2, HY8, OTHER: HEC-RAS)

ENERGY SLOPE: SSR= 0.00009 ft/ft
USGS=
KNOWN TAILWATER= FIS X-Section I ~ 200' d/s - Elev 756.5

MANNING "N" LEFT: 0.07 CHANNEL: 0.04 RIGHT: 0.07
LEFT: CHANNEL: RIGHT:

COMMENTS:

EXISTING CONDITIONS *****

QBR = 3000 cfs
QRD =
A (br) =
VEL = 2.83 ft/sec
FLOW Type = low flow

*No existing
Bridge*

HW-100 = 757.42 sec 9
NATURAL =
BACKWTR =
EXIT = 756.5

PROPOSED CONDITIONS *****

QBR = 3000 cfs
QRD = 0
A (br) = 769 sq ft
VEL = 3.9 ft/sec
FLOW Type = low flow

HW-100 = 757.73 sec 9
NATURAL =
BACKWTR =
EXIT = 756.5

HW2 = 752.7 SCOUR CODE 8

PROPOSED STRUCTURE: Single span, 45W" RSB, 106' span COST: \$ 350,000

EXTENT OF BACKWATER REACH (N/A IF NO INCREASE IN BACKWATER): 14,600 ft

COMMENTS: Combined backwater due to USH 45 & Frontage Rds
~ 0.35' @ Sec 9 - Property owners were notified
at the time of USH 45 construction -

NK 3-9-10

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Cnt W S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	1	2 yr	45" psg	830.00	743.50	752.50	746.21	752.54	0.000196	1.91	785.97	310.74	0.11
Reach-1	1	2 yr	Existing	830.00	743.50	752.50	746.21	752.54	0.000196	1.91	785.97	310.74	0.11
Reach-1	1	100 yr	45" psg	4000.00	743.50	756.52	751.56	756.62	0.000433	3.66	3000.94	1051.25	0.18
Reach-1	1	100 yr	Existing	4000.00	743.50	756.52	751.56	756.62	0.000433	3.66	3000.94	1051.25	0.18
Reach-1	2	2 yr	45" psg	760.00	744.30	752.50	747.81	752.59	0.000352	2.62	386.05	295.37	0.17
Reach-1	2	2 yr	Existing	760.00	744.30	752.50	747.81	752.58	0.000309	2.46	490.91	295.48	0.16
Reach-1	2	100 yr	45" psg	3000.00	744.30	756.47	751.78	756.78	0.000796	5.26	754.77	576.00	0.28
Reach-1	2	100 yr	Existing	3000.00	744.30	756.54	752.38	756.67	0.000410	3.79	1217.32	576.00	0.20
Reach-1	2.25			Bridge									
Reach-1	2.5	2 yr	45" psg	760.00	744.30	752.53	747.81	752.62	0.000346	2.61	388.50	298.00	0.17
Reach-1	2.5	100 yr	45" psg	3000.00	744.30	756.54	751.78	756.85	0.000774	5.21	761.53	576.00	0.27
Reach-1	3	2 yr	45" psg	760.00	744.90	752.51		752.67	0.000608	3.38	264.93	53.31	0.22
Reach-1	3	2 yr	Existing	760.00	744.90	752.50		752.66	0.000609	3.38	264.72	53.28	0.22
Reach-1	3	100 yr	45" psg	3000.00	744.90	756.34		757.12	0.001808	7.75	484.48	58.08	0.41
Reach-1	3	100 yr	Existing	3000.00	744.90	756.29		757.08	0.001841	7.80	481.48	58.08	0.42
Reach-1	3.5			Bridge									
Reach-1	4	2 yr	45" psg	760.00	744.90	752.54	748.18	752.70	0.000598	3.36	266.66	53.52	0.22
Reach-1	4	2 yr	Existing	760.00	744.90	752.53	748.18	752.69	0.000599	3.36	266.45	53.50	0.22
Reach-1	4	100 yr	45" psg	3000.00	744.90	756.56	752.24	757.31	0.001675	7.56	497.63	58.08	0.40
Reach-1	4	100 yr	Existing	3000.00	744.90	756.50	752.24	757.26	0.001710	7.61	494.00	58.08	0.40
Reach-1	6	2 yr	45" psg	760.00	744.30	752.65	747.89	752.74	0.000326	2.52	385.68	276.69	0.16
Reach-1	6	2 yr	Existing	760.00	744.30	752.64	747.89	752.72	0.000324	2.51	383.46	274.83	0.16
Reach-1	6	100 yr	45" psg	3000.00	744.30	757.20	751.88	757.48	0.000653	4.92	776.23	312.68	0.25
Reach-1	6	100 yr	Existing	3000.00	744.30	757.03	751.77	757.34	0.000718	5.11	734.61	312.68	0.26
Reach-1	6.5			Bridge									
Reach-1	7	2 yr	45" psg	760.00	744.30	752.68	747.89	752.76	0.000321	2.51	387.62	279.04	0.16
Reach-1	7	2 yr	Existing	760.00	744.30	752.68	747.89	752.73	0.000255	2.24	510.88	278.83	0.15
Reach-1	7	100 yr	45" psg	3000.00	744.30	757.27	751.88	757.55	0.000637	4.88	782.77	312.68	0.25
Reach-1	7	100 yr	Existing	3000.00	744.30	757.25	752.10	757.38	0.000346	3.59	1197.49	312.68	0.18
Reach-1	7.5	2 yr	45" psg	760.00	744.30	752.70	747.88	752.77	0.000308	2.46	396.87	281.05	0.16
Reach-1	7.5	100 yr	45" psg	3000.00	744.30	757.31	751.83	757.58	0.000619	4.82	788.94	312.68	0.25
Reach-1	7.75			Bridge									
Reach-1	7.79	2 yr	45" psg	760.00	744.30	752.72	747.88	752.80	0.000304	2.45	398.79	283.41	0.16

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Cnt. W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	7.79	100 yr	45" psg	3000.00	744.30	757.38	751.83	757.65	0.000603	4.78	795.20	312.68	0.24
Reach-1	8	2 yr	45" psg	760.00	744.50	752.74	747.95	752.81	0.000277	2.33	507.35	263.26	0.15
Reach-1	8	2 yr	Existing	760.00	744.50	752.71	747.95	752.77	0.000263	2.26	623.32	260.97	0.15
Reach-1	8	100 yr	45" psg	3000.00	744.50	757.55	752.12	757.70	0.000393	3.88	1195.46	482.75	0.20
Reach-1	8	100 yr	Existing	3000.00	744.50	757.36	752.18	757.42	0.000214	2.83	2100.92	478.30	0.14
Reach-1	9	2 yr	45" psg	760.00	744.60	752.82		752.89	0.000278	2.32	544.14	221.72	0.15
Reach-1	9	2 yr	Existing	760.00	744.60	752.78		752.85	0.000287	2.34	534.86	219.74	0.15
Reach-1	9	100 yr	45" psg	3000.00	744.60	757.73		757.79	0.000216	2.88	2209.24	434.15	0.15
Reach-1	9	100 yr	Existing	3000.00	744.60	757.42		757.49	0.000250	3.05	2076.59	421.65	0.16
Reach-1	10	2 yr	45" psg	760.00	744.50	753.01		753.09	0.000278	2.45	524.48	193.68	0.15
Reach-1	10	2 yr	Existing	760.00	744.50	752.98		753.06	0.000285	2.47	517.51	191.84	0.15
Reach-1	10	100 yr	45" psg	3000.00	744.50	757.89		757.99	0.000293	3.46	2075.22	442.37	0.17
Reach-1	10	100 yr	Existing	3000.00	744.50	757.60		757.71	0.000335	3.64	1951.15	427.82	0.18
Reach-1	11			Bridge									
Reach-1	12	2 yr	45" psg	760.00	744.50	753.14	747.67	753.21	0.000257	2.38	549.96	200.28	0.15
Reach-1	12	2 yr	Existing	760.00	744.50	753.11	747.67	753.18	0.000263	2.40	542.52	198.37	0.15
Reach-1	12	100 yr	45" psg	3000.00	744.50	758.40	752.22	758.48	0.000231	3.15	2308.98	468.54	0.15
Reach-1	12	100 yr	Existing	3000.00	744.50	758.33	752.22	758.40	0.000239	3.19	2273.18	464.63	0.15
Reach-1	14	2 yr	45" psg	760.00	744.50	753.17		753.23	0.000251	2.14	555.53	201.69	0.14
Reach-1	14	2 yr	Existing	760.00	744.50	753.13		753.20	0.000256	2.15	548.17	199.82	0.14
Reach-1	14	100 yr	45" psg	3000.00	744.50	758.42		758.49	0.000221	2.86	2319.34	469.67	0.14
Reach-1	14	100 yr	Existing	3000.00	744.50	758.35		758.42	0.000229	2.90	2283.86	465.80	0.14
Reach-1	16	2 yr	45" psg	760.00	744.70	753.61		753.63	0.000114	1.49	1200.62	531.17	0.09
Reach-1	16	2 yr	Existing	760.00	744.70	753.59		753.61	0.000116	1.50	1186.56	527.56	0.09
Reach-1	16	100 yr	45" psg	3000.00	744.70	758.73		758.74	0.000059	1.49	5703.93	1227.62	0.07
Reach-1	16	100 yr	Existing	3000.00	744.70	758.67		758.68	0.000061	1.51	5624.12	1218.74	0.07
Reach-1	18	2 yr	45" psg	760.00	744.70	753.72		753.73	0.000033	0.81	2778.69	1472.95	0.05
Reach-1	18	2 yr	Existing	760.00	744.70	753.70		753.70	0.000034	0.81	2743.78	1460.15	0.05
Reach-1	18	100 yr	45" psg	3000.00	744.70	758.77		758.77	0.000006	0.49	16722.86	4186.79	0.02
Reach-1	18	100 yr	Existing	3000.00	744.70	758.70		758.70	0.000006	0.49	16492.81	4152.41	0.02
Reach-1	20	2 yr	45" psg	760.00	745.00	753.91		753.91	0.000036	0.82	2515.90	1176.59	0.05
Reach-1	20	2 yr	Existing	760.00	745.00	753.89		753.89	0.000037	0.83	2493.12	1170.95	0.05
Reach-1	20	100 yr	45" psg	3000.00	745.00	758.81		758.81	0.000013	0.68	11790.78	2604.30	0.03
Reach-1	20	100 yr	Existing	3000.00	745.00	758.75		758.75	0.000013	0.69	11629.84	2586.25	0.03