Minnesota Dam Safety Permit Application
Fargo-Moorhead Metropolitan Area Flood Risk Management Project

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Governors' Task Force Summary

In late 2017, North Dakota Governor Doug Burgum and Minnesota Governor Mark Dayton created a joint Fargo-Moorhead Area Flood Diversion Task Force (Task Force) to propose the framework for flood risk management for the Fargo-Moorhead region and for possible alterations to the FM Area Flood Risk Management Project (Project). The Task Force consisted of both Governors, serving as Task Force Co-Chairs, along with sixteen (16) appointed members (eight (8) appointed by each Governor). Over a series of five (5) meetings between October 23, 2017, and December 11, 2017, the Task Force's role was to discuss flood control options and make recommendations with the understanding that these recommendations are available for consideration by the FM Diversion Authority for a future permit application for flood control. The work of the Task Force is summarized in their final report entitled "Fargo-Moorhead Area Flood Diversion Task Force Final Report", dated January 18, 2018. The Task Force report is included as an attachment to this permit application.

A Technical Advisory Group (TAG) was created as an advisory group to the Task Force to assess components and alternatives and provide technical guidance to the Task Force. The TAG analysis was summarized in its report entitled "Governors' Fargo-Moorhead Area Flood Diversion Task Force – Technical Advisory Group Final Report," dated December 20, 2017.

A number of recommended Project changes came out of the Task Force and TAG meetings. These mainly related to hydrology, allowable flow through the Fargo-Moorhead urban area, the location of tieback levees in North Dakota and Minnesota, and changes to the location of the Dam/Southern Embankment (D/SE). The D/SE collectively includes three (3) gated control structures—the Red River Structure, the Wild Rice River Structure, and the Diversion Inlet Control Structure—and an earthen embankment, as set forth more fully in the Preliminary Report. The recommended changes include:

- The Task Force directed the TAG to use full period of record hydrology for its analysis. Based on this direction, the analysis uses a 1-percent annual chance (100-year) discharge of 33,000 cubic feet per second (cfs) at the USGS Fargo stream gage.

- The TAG recommended using the Western Tieback alignment, which shifts the Limited Service Spillway for the D/SE to the west along an existing natural ridge that runs south and west from Horace.

- The TAG recommended using an Eastern Tieback alignment that turns the D/SE south in Section 2 of Holy Cross Township, Clay County and extends south for approximately 5.5 miles and ties into existing high ground in Section 36 of Holy Cross Township near Clay County Highway 50.

- The TAG recommended that a flow through the Fargo-Moorhead urban area that results in a river stage (RS) 37' at the USGS Fargo stream gage during the 100-year flood event be carried forward. The communities will have to construct additional protection to manage the additional flows through the Fargo-Moorhead urban area associated with RS37'.

- The TAG developed and evaluated three (3) alignment options for the D/SE. The alignments generally shifted the D/SE north and shifted Staging Area impacts into North Dakota.

Subsequent to the conclusion of the Task Force meetings, the TAG membership was expanded to include an engineer from the Richland – Wilkin Joint Powers Authority (RWJPA) and representation from the US Army

Corps of Engineers. The TAG continued to meet and further refine and evaluate alternatives. In evaluating alignments, TAG focused on criteria that were identified in the Task Force meetings, mainly:

- Strive for equity in impacts – ND/MN
- Minimize acres removed from the floodplain
- Minimize newly impacted acreage and structures
- Minimize impacts in Wilkin County, MN and Richland County, ND, with a goal of reducing the newly impacted acreage to 640 acres or fewer
- Consider economics – cost increases and reductions

In an effort to satisfy these criteria, a new alternative for the Eastern Tieback was identified that turns the D/SE south at the Red River Structure and follows an alignment between Wolverton Creek and U.S. Highway 75, and the Red River. This alignment has been referenced as Option 10D and would eliminate the need for a ring levee for the City of Comstock and for grade raises for the BNSF Moorhead Subdivision rail line and U.S. Highway 75. This alignment also significantly reduces the acres of impacted organic farms as well as the newly impacted floodplain and residential structures in Minnesota. Combined with other proposed changes to the Project included with this permit application, the number of impacted cemeteries is reduced from eleven (11) cemeteries to seven (7) cemeteries.

Combined with Option 7A (from the Task Force and TAG reports), which shifts the alignment for the D/SE north approximately two (2) miles between the City of Horace and Interstate 29, and the other Task Force recommendations, Option 7A/10D (also referred to as Plan B) addresses the criteria identified above and is being used as the proposed Project for this permit application. Differences between Plan B and the pre-Task Force alignment are summarized in the following tables:

Pre-Task Force vs. Plan B Alignment:

Pre-Task Force Alignment (100-year POR)

	Impacted Lands	**ND**	**MN**	**Splits**	**Richland**	**Wilkin**
A	Staging Area Total Acres	20,676	14,780	58% ND / 42% MN	4,387	2,551
B	Staging Area Additional Acres (newly inundated)	7,088	11,631	38% ND / 62% MN	1,124	1,391
C	Diversion Channel Footprint (acres)	6,800	0	100% ND	0	0
D	Southern Embankment Footprint (acres)	750	430	64% ND / 36% MN	0	0
E	**Total Acres & Footprint**	**28,226***	**15,210***	**65% ND / 35% MN**	**4,387***	**2,551***
F	Total Impacted Residential Structures in the Staging Area	44	25	64% ND / 36% MN	3	5
G	Newly Impacted Staging Area Residential Structures	35	22	61% ND / 39% MN	3	3
H	Protected Acres	47,145	10,992	81% ND / 19% MN	-	-

*Total acreage is sum of rows A+C+D.

Plan B Alignment (100-year POR)

	Impacted Lands	ND	MN	Splits	Richland	Wilkin
A	Staging Area Total Acres	22,585	5,420	81% ND / 19% MN	2,783	1,407
B	Staging Area Additional Acres (newly inundated)	7,751	3,286	70% ND / 30% MN	596	385
C	Diversion Channel Footprint (acres)	6,800	0	100% ND	0	0
D	Southern Embankment Footprint (acres)	1,100	420	72% ND / 28% MN	0	0
E	**Total Acres & Footprint**	**30,485***	**5,840***	**84% ND / 16% MN**	**2,783***	**1,407***
F	Total Impacted Residential Structures in the Staging Area	60	11	85% ND / 15% MN	2	2
G	Newly Impacted Staging Area Residential Structures	44	8	85% ND / 15% MN	2	0
H	Protected Acres	41,187	9,456	81% ND / 19% MN	-	-

*Total acreage is sum of rows A+C+D.

Difference Between Pre-Task Force and Plan B Alignment (100-year POR)

	Impacted Lands	ND	MN	Splits	Richland	Wilkin
A	Staging Area Total Acres	1,909	-9,360	-	-1,604	-1,144
B	Staging Area Additional Acres (newly inundated)	663	-8,345	-	-528	-1,006
C	Diversion Channel Footprint (acres)	0	0	-	0	0
D	Southern Embankment Footprint (acres)	350	-10	-	0	0
E	**Total Acres & Footprint**	**2,259***	**-9,370***	**-**	**-1,604***	**-1,144***
F	Total Impacted Residential Structures in the Staging Area	16	-14	-	-1	-3
G	Newly Impacted Staging Area Residential Structures	9	-14	-	-1	-3
H	Protected Acres	-5,958	-1,536	-	-	-

*Total acreage is sum of rows A+C+D.

A figure (Item B/Attachment 1) showing the Plan B alignment and illustrating these changes is included with this permit application.

Preliminary Report

Preliminary Report Submittal Item A: General Statement Setting Forth the Effect on the Environment

Additional micro-siting has been performed on the Plan B revised alignment subsequent to the March 16, 2018 permit application. The micro-siting included minor shifts of the alignment to provide more gradual curves in the dam/southern embankment alignment; realignment to protect the Lower Wild Rice Cemetery, extending the Eastern Tieback to the east along 180th Ave. S. to high ground, and other minor shifts where structures could be protected. The micro-sited alignment is shown in Item D/Attachment 3. Some of the design details associated with Plan B and on the various Project elements detailed in the Preliminary Report are still under development and will be provided through the permit process as it is developed and becomes available. As a result, the FM Diversion Authority anticipates that permitting for the Project will occur in phases.

The Project utilizes a Dam/Southern Embankment (D/SE) and Staging Area to offset hydraulic impacts from the diversion channel. The D/SE generally consists of an earthen embankment and three (3) gated control structures that, during times of operation, function together to control the flow of water downstream and by storing water within the Staging Area. The gated control structures include the Red River Structure, the Wild Rice River Structure, and the Diversion Inlet Structure. Additionally, box culverts would be installed where the D/SE crosses Wolverton Creek. Attachment 12 includes plan and profile drawings for the Red River Structure and Wolverton Creek Structure. The embankments are raised structures constructed of soil that extend from high ground in Minnesota to high ground in North Dakota and tie into the gated control structures. Construction of the D/SE would directly disturb approximately 2,084 acres of land (1,408 acres in ND and 676 acres in MN) including the loss of approximately eleven (11) acres of non-wetland forest. Direct impacts to wetlands and aquatic resources include the loss of approximately one hundred fifty eight (158) acres of non-forested wetlands, fifty-five (55) acres of riparian forest, and alteration of twenty two (22) acres of riverine aquatic habitat.

A general overview of the effects on the environment from construction of selected features and Project operation is provided below. A detailed explanation of each feature of the D/SE is provided in Preliminary Report Submittal Item I.

Red River and Wild Rice River Structures. The Red River Structure would result in direct and indirect impacts to approximately thirteen and one-half (13.5) acres of aquatic (riverine) habitat. Direct impacts to the Red River resulting from filling and excavating total approximately five and one-half (5.5) acres. Indirect impacts to the Red River resulting from channel abandonment total approximately eight (8) acres. The Wild Rice River Structure is expected to impact approximately seven (7) acres of aquatic habitat. When operated during flood events, these gated control structures would limit flows downstream in the Red and Wild Rice Rivers and cause the water to accumulate in the Staging Area.

Wolverton Creek Structure. The Wolverton Creek Structure would result in direct impacts to approximately one and one-third (1.3) acres of aquatic (riverine) habitat through the placement of three ten (10) foot box culverts within the creek along with rock riprap. The purpose of the Eastern Tieback is to allow flow to overtop the tieback during the PMF event; flows passing over the embankment and through the Wolverton Creek Structure during the PMF event will not be greater than the flows passing through this location under existing conditions, ensuring that PMF water surface elevations in Comstock do not increase.

Diversion Inlet Structure. The Diversion Inlet Structure is located primarily in upland areas except for approximately seven (7) acres of direct wetland impacts, including five (5) acres of seasonally flooded wetlands and two (2) acres of shallow marsh wetlands.

Staging Area. To minimize downstream impacts, the Staging Area utilizes 28,900 acres (11,600 acres newly inundated) to store approximately 180,000 acre-feet of floodwaters (110,000 acre-feet additional) during a 100-year event. Water would begin to pool behind the D/SE when the gates on the Red and Wild Rice River Structures are partially closed, which limits flows through the Fargo-Moorhead urban area. The maximum pool elevation for a 100-year event is 921.0. The Staging Area will be regulated so that the required volume is maintained. The FM Diversion Authority will mitigate for impacts within the Staging Area as described in the attached Property Rights Acquisition and Mitigation Plan (Attachment 7)

Operational Effects. The Red River and Wild Rice River Structures will include gates across the river channels which would be utilized to control flood flows. The final design of the Wild Rice River Structure will accommodate fish passage up to a 20-year event. When the structures are not in operation, the gates would be open, and there would be limited anticipated impacts to fish passage and biological connectivity. Under the proposed operation scenario, the gates of the Red River and Wild Rice River Structures would be open and not in operation as long as the flood event would not produce a stage greater than thirty seven (37.0) feet at the Fargo gage. When the Red River and Wild Rice River Structures are in operation, the gates would be partially closed to store water and facilitate use of the Diversion Inlet Control Structure. This would result in increased flow velocities through the Red River and Wild Rice River Structures.

When flood waters are held in the upstream Staging Area, fish may leave the Red River channel and access the adjacent floodplain which creates a risk for fish stranding. Project operation will limit Staging Area stage fall rates to the natural stage fall rate. This will allow fish time to follow the receding waters back into the channel of the Red River. Some fish could become isolated or stranded, but the magnitude is not expected to be significant. Please see the environmental mitigation section of the Property Rights Acquisition and Mitigation Plan for additional information.

Preliminary Report Submittal Item B: Maps showing the location of county, township, and section lines; the outline of the impoundments; the location of state, county, and township roads, the locations of utilities, e.g. pipelines, transmission, telegraph, and telephone lines; the topography; and other structure or facilities including dwellings affected by the proposed Dam/Southern Embankment. State, county, and USGS maps and aerial photographs may be used for this purpose.

See attached maps showing Project features and impacted utilities and structures. Filename:

- ATTACHMENT_1_Item_B_PERMIT_MAP_STRS_UTIL_2018.pdf

Preliminary Report Submittal Item C: Written Report of Surface Conditions Based on Field Examinations by U.S. Army Corps of Engineers Geotech and Geology Branch Staff

This information is provided as a separate attachment titled *Generalized Subsurface Conditions of the Fargo-Moorhead Metro Area for the Dam Safety Permit Application Preliminary Report.* Because of the file size limitations in MPARS, the report has been broken into seven (7) different pdfs consisting of the main report and a separate file for each of the six (6) attachments. The filenames are provided below:

- Attachment_2_Item_C_FMM_Subsurface_Conditions_2018_Main Report.pdf
- Attachment_2_Item_C_FMM_Subsurface_Conditions_2018_Attachment 1.pdf (Seismic Information)
- Attachment_2_Item_C_FMM_Subsurface_Conditions_2018_Attachment 2.pdf (Soil Exploration Maps for Feasibility Alternatives)
- Attachment_2_Item_C_FMM_Subsurface_Conditions_2018_Attachment 3.pdf (Soil Exploration Maps for North Dakota Diversion)
- Attachment_2_Item_C_FMM_Subsurface_Conditions_2018_Attachment 4.pdf (Instrumentation)
- Attachment_2_Item_C_FMM_Subsurface_Conditions_2018_Attachment 5.pdf (PED Undisturbed Testing Results)
- Attachment_2_Item_C_FMM_Subsurface_Conditions_2018_Attachment 6.pdf (Selected Parameters)

Preliminary Report Submittal Item D: Typical cross-sections of the D/SE accurately showing elevations, proposed impoundment levels, and top widths.

See attached typical cross sections and Project features map. Filename:

- Attachment_3_Item_D_Crosssections_and_Features_2018_06_01.pdf

Preliminary Report Submittal Item E: Logs of Borings in the Foundation and Borrow Areas and Results of Seismic and Resistivity Subsurface Investigations.

The boring logs completed along the previous alignments are included. Geotechnical information is required for the modified alignment and will be made available within the detailed design documentation.

The US Army Corps of Engineers did not complete seismic and resistivity subsurface investigations as part of this study.

See attached boring logs:

- Attachment 4_Item E_FMMFRM_2018_BORINGLOGS.pdf

Preliminary Report Submittal Item F: Preliminary design assumptions, operational aspects, tentative conclusions, and references. The design assumptions shall pertain to such hydrologic features as drainage area, rainfall data, inflow, area-capacity-elevation data, and flood routing, in addition to structural, geologic, and geotechnical assumptions.

The Red River, Wild Rice River, Sheyenne River, Maple River, Lower Rush River, Rush River and Wolverton Creek all contribute to the flood risk for the Fargo-Moorhead urban area. The upstream end of the Project, where the D/SE is located, is primarily influenced by flooding from the Red River and Wild Rice River.

The primary streamflow reporting station for the Red River in the Fargo-Moorhead metropolitan area is USGS Gage 05054000, which is located at the Fargo water treatment plant on 4th Street South, at river mile 453, approximately twenty five (25) miles upstream of the mouth of the Sheyenne River. USGS Gage 05054000 is below the confluence of the Red River and Wild Rice River. The total drainage area at this gage is 6,800 square miles of which 2,175 square miles are considered noncontributing. Of the remaining 4,625 square miles, 1,405 square miles are controlled by White Rock Dam and Orwell Dam. The gage location and datum have changed several times during the 109 years of continuous existence and the gage currently has a datum elevation of 862.74 feet NAVD88, which is equivalent to the USGS published value of 861.8 feet NGVD29. The continuous period of record dates back to May 1901, with historic flood information available for 1882 and 1897.

The largest observed flow occurred on March 28, 2009, and had an estimated instantaneous peak discharge of 29,500 cfs. The second highest flood of record occurred on April 17, 1997 with an instantaneous peak discharge of 28,000 cfs. Historic flood information indicates peak discharges of 20,000 cfs occurred on April 11, 1882 and 25,000 cfs occurred on April 7, 1897.

The following provides more detail on the hydrologic and hydraulic evaluation performed for the Project design. Additional details on the hydrologic and hydraulic evaluation for Plan B are found in Attachment 11.

Hydrologic and Hydraulic Evaluation for Project Design. Official estimates vary for the 100-year flood flow and stage on the Red River through Fargo-Moorhead (USGS Gage 05054000). With the revised Clay County Flood Insurance Study (FIS) in 2012 and Cass County FIS in 2015, the Federal Emergency Management Agency (FEMA) has raised their 100-year flood stage from 38.3 to 39.3 feet at the Fargo gage. FEMA continues to use a 100-year flow of 29,300 cubic feet per second (cfs) based on hydrology that dates back to the 1970s. An updated period of record hydrologic analysis through 2009 would increase the 100-year flow from 29,300 cfs to 33,000 cfs, which would increase the 100-yr flood stage to something between 40.7 feet and about 41.5 feet, the exact value depending on levee effectiveness and a more detailed analysis than has been completed to date for a flow of 33,000 cfs. The 500-year flow for a period of record hydrologic analysis through 2009 is 66,000 cfs.

The hydraulic modeling (assessment of flood stages) continues to be improved as the complicated flow conditions in the flat Red River floodplain are studied and then captured in the models. All stages are referenced to the Fargo gage, unless noted. All elevations are relative to North American Vertical Datum of 1988 (NAVD 88), unless noted. The current hydraulic modeling indicates that the 100-year flood stage is 41.5 feet with permanent and emergency levees in place and 40.7 feet with permanent levees in place, but no emergency levees providing protection for the Fargo-Moorhead urban area. The following table shows the flow and stage information used by FEMA and estimates of stages associated with an updated period of record hydrologic analysis (through 2009). Additional information on peak flows and stage data can be found in Attachment 11.

Table F.1 Peak Flow and Stage Data – USGS Gage 05054000 Red River at Fargo, ND

Event	Discharge (cfs) at USGS Gage at Fargo, ND	Stage (feet) at USGS Gage at Fargo, ND*
10-year FEMA	10,300	29.5
10-year Period of Record (through 2009)	13,865	33.1
50-year FEMA	22,300	36.6
50-year Period of Record (through 2009)	26,000	39.7
100-year FEMA	29,300	39.3
100-year Period of Record (through 2009)	33,000	41.4
500-year FEMA	50,000	43.5
500-year Period of Record (through 2009)	66,000	44.6

**Stages are dependent: 1) FEMA data are from the Clay County Flood Insurance Study, April 17, 2012; only accredited levees are given credit in a FEMA study; 2) Period of Record stages are from the current existing-condition-with-full-protection (includes a full line of permanent and emergency flood protection measures constructed to a 44' stage profile) unsteady Hydrologic Engineering Center River Analysis System (HEC-RAS) model – Phase 9.0; and 3) Flood stage is eighteen (18) feet when minor flooding begins (National Weather Service).*

The hydrologic analyses also made use of watershed-wide gage data and detailed Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) models that were created for each of the contributing watersheds. These models include all of the major rivers and local drains that are tributaries to the Red River starting from the upper end at Lake Traverse, to the City of Drayton, ND, at the downstream end.

The hydraulic analysis was a Hydrologic Engineering Center River Analysis System (HEC-RAS) unsteady flow model calibrated to the 2009 Flood, and was verified by comparing the results to hydrographs and high water marks from the 1997, 2006, 2010, and 2011 events. The following table provides the observed peak flow and stage information for those historic floods.

Table F.2 Historic Flood Events – USGS Gage 05054000 Red River at Fargo, ND

Event	Discharge (cfs) at USGS Gage at Fargo, ND	Stage (ft) at USGS Gage at Fargo, ND
1997 Historic	28,000	39.7
2006 Historic	19,900	37.1
2009 Historic	29,500	40.8
2010 Historic	21,200	37.0
2011 Historic	27,200	38.8

Source: USGS recorded data

The models were built by a team of consultants and US Army Corps of Engineers staff to allow for continual checks and balances during model development and refinement. The models are subjected to continual refinement as additional information is obtained.

Preliminary Report Submittal Item G: Preliminary Cost Estimate

Based on the Plan B alignment, the estimated construction cost is $545 million. This cost includes estimates for the embankments, the three (3) control structures, transportation improvements, local drainage improvements, and environmental mitigation. Additional costs include land acquisition, utility relocations, additional In-Town Levees to allow an increased stage through the urban area of thirty seven (37) feet, and the Oxbow-Hickson-Bakke Ring Levee, totaling $205 million. Note that this cost estimate does not include costs associated with the Diversion Channel and associated features (aqueducts, transportation relocations, etc.), as described in Preliminary Report Submittal Item I. These costs are at a February 2018 price level and include contingencies.

Preliminary Report Submittal Item H: Future Plans on Ultimate Project Size Including Dams and Impoundments

This requirement is not applicable to the Project.

Preliminary Report Submittal Item I: A general description of all other activities and elements related to and part of the total dam project, such as operational plans and details of smaller dams, dikes, diversions, reclaim water facilities, and other facility and utility lines including pipelines, roads, and railroads. The report shall identify each element or activity of the total dam project which would require a permit under the provisions of parts 6115.0150 to 6115.0260.

The Project consists of a diversion channel around the western side of the Fargo-Moorhead urban area and the Dam/Southern Embankment (D/SE) south of the metropolitan area that will store water on a temporary basis to minimize downstream stage impacts.

Diversion Channel: The Diversion Channel would extend north approximately thirty (30) miles in length from Diversion Inlet Control Structure near County Road 17 just southeast of Horace, ND, downstream to its outlet north of the Sheyenne River mouth near Georgetown, MN. The path of the Diversion Channel will take it west of Horace, West Fargo, and Harwood. The Diversion Channel intersects the Sheyenne River, Maple River, Lower Rush River, Rush River, and a number of additional public and private drains.

The Diversion Channel is designed to receive 20,000 cfs for the 100-year flood at the Diversion Inlet Control Structure and additional water from intersected downstream drainages. The Diversion Channel will have a bottom width of 300 feet and a variable-width, low-flow channel that has been sized based on sediment transport considerations.

The depth of the Diversion Channel will range from fifteen (15) to twenty five (25) feet deep excluding the low-flow channel and twenty (20) to thirty (30) feet deep including the low-flow channel. The general longitudinal slope of the diversion will be 0.9 feet/mile, with the low-flow channel having a slightly flatter slope due to the meandering pattern. The side slopes outward from the 300-foot bottom width will be 7H to 1V, and include geotechnical "benches" of zero (0) to thirty (30) feet wide, as needed, to provide additional stability to meet the required factors of safety.

Dam/Southern Embankment: The D/SE consists of an earthen embankment and three (3) gated structures that control outflows from the D/SE: Diversion Inlet Control Structure, Wild Rice River Structure, and Red River Structure. The D/SE will be constructed to meet US Army Corps of Engineers dam safety criteria. It will generally have a top width of fifteen (15) feet with 4H to 1V side slopes. The D/SE extends approximately 20 miles from high ground in Minnesota to high ground in North Dakota along the alignment shown in the attached maps (Item B/Attachment 1). Additional information on the D/SE, western tieback, and eastern tieback, including the concept-level design of the Wolverton Creek crossing along the eastern tieback, is presented in Attachment 11.

Eastern Tieback/Wolverton Creek Structure: The D/SE at the Red River Structure transitions from an elevation of 930 at the Red River Structure, to approximately 931 feet at the southern end immediately west of Highway 75, to an elevation of 926 feet at Highway 75. Between Highway 75 and the eastern edge of the railroad embankment, the tieback will be built to an elevation of 925.9 feet. Between the eastern edge of the railroad and natural high ground to the east of Wolverton Creek, the tieback embankment will be built to an elevation of 924.3 feet. The eastern edge of the tieback will tie in to ground that is naturally at an elevation of 924.3 feet. Because the tieback will cross Wolverton Creek, three 10-ft by 10-ft box culverts will be installed at the Wolverton Creek Structure location, as shown in Attachment 12. The culvert sizes

were selected to ensure water surface elevations do not increase for the 1% and 0.2% ACE events. Backwater may propagate upstream of the Eastern Tieback for less frequent events.

The embankment elevations east of Highway 75 and culvert sizes at Wolverton Creek were selected to allow flow to overtop the embankment during the PMF event; however, flows passing over the embankment and through the culverts during the PMF event will not be greater than the flows passing through this location under existing conditions, ensuring that PMF water surface elevations in Comstock do not increase.

Red River and Wild Rice River Structures: A gated structure will be constructed adjacent to the Red River in Pleasant Township, Cass County, ND (Red River Structure) as shown in Attachment 12. A similar gated structure will be constructed adjacent to the Wild Rice River in Pleasant Township, Cass County, ND (Wild Rice River Structure), with similar reviews by appropriate permitting authorities. The structures will be constructed adjacent to the existing channels in order to keep the sites dry during construction. The Red River Structure is expected to consist of three (3) 50-foot wide gates, and the Wild Rice River Structure is expected to consist of two (2) 40-foot wide gates. The sills of both structures will be at the existing river bed elevations.

Once the gated structures are built, the Red River and Wild Rice River will be rerouted through the gated structures. The gates will be fully open unless a flood event large enough to warrant operation of the gates occurs. When operated during flood events, these structures and their gates will limit flows downstream in the natural channels and cause the water to accumulate upstream of the D/SE.

Diversion Inlet Structure: The Diversion Inlet Structure will be located where the Diversion Channel crosses Cass County Highway 17 in the southwest quarter of Section 32, Stanley Township, Cass County, ND. The Diversion Inlet Structure will consist of three (3) 50-foot wide gates that will control flow going into the Diversion Channel. Conditions on the Red, Wild Rice, Sheyenne, Maple, and Rush Rivers, and Wolverton Creek will be monitored to determine gate operation need and to minimize downstream impacts.

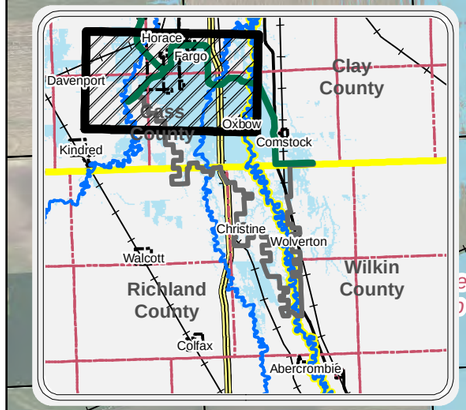
Staging Area: Based on the estimated depth and duration of the 100-year flood, approximately 110,000 acre-feet of additional storage within approximately 28,000 acres is required to minimize downstream stage impacts. This required area of storage is generally referred to as the Staging Area. Water will begin to pool upstream of the D/SE when the gates of the Red and Wild Rice River Structures are partially closed to limit flows through the Fargo-Moorhead urban area. The Red River and Wild Rice River Structures will be operated to produce a pool of 921.0 feet for the 100-year flood and a pool of no greater than 922.5 feet for the 50-year flood at the upstream end of the Western Tieback. The deeper portions of the Staging Area will be regulated similar to a floodway so that the required volume is maintained.

A ring levee system will surround the City of Oxbow, Village of Hickson, and the Bakke Subdivision (OHB) in the Staging Area. Interstate 29 will be raised through the Staging Area. The grade raise will be slightly above the 500-year flood elevation to maintain access when the control structure gates are in operation. Other roads within the Staging Area will be allowed to flood when the control structure gates are in operation. Utilities located in the Staging Area will be evaluated during Project design and raised or relocated as needed.

Consequence Analysis: The FM Diversion Authority and US Army Corps of Engineers have been collaborating with MNDNR and the North Dakota State Water Commission to support the desire to better understand the consequences associated with a breach of the proposed D/SE. The US Army Corps of Engineers has produced

maps of depth and depth times velocity for the breach locations studied and will be providing the memorandum detailing the methods and results to the two states in the near future. The FM Diversion Authority and US Army Corps of Engineers will continue to be committed to working with the two states to determine the proper response associated with areas identified as having a high potential for negative consequences should a breach of the D/SE occur.

Project Operation: Operation of the Project is discussed in Attachment 11.



Sheyenne River Hydraulic Structure

Diversion Channel

Sheyenne River

Diversion Inlet Control Structure

Western Tie-back Embankment

Wild Rice River

Wild Rice River Control Structure

Red River Control Structure

I-29 Grade Raise

Fargo

Horace

Stanley Twp

Kurtz Twp

Normanna Twp

Pleasant Twp

Holy Cross Twp

Oxbow

Cass County

Clay County

14 29 21 16 8 65 17 S 36 17 29 81 25

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N W E S

0 1,750 3,500 7,000 Feet

1 in = 3,500 feet

Legend

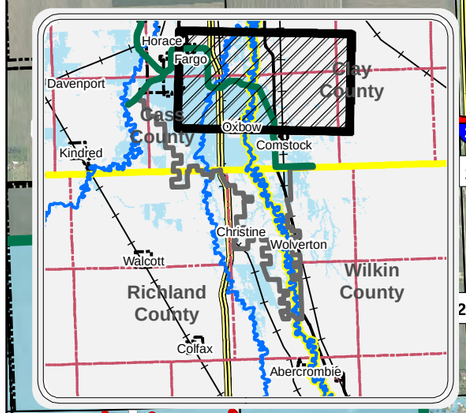
- Plan B Dam Alignment
- Ring Dike
- Analysis Boundary (Depth Dif. >0.1')
- 1-Percent Annual Chance Floodplain

Impacted Strctures

- Residential
- Non-Residential

- CITY LIMITS
- CIVIL TOWNSHIPS
- PLSS SECTIONS

HMG



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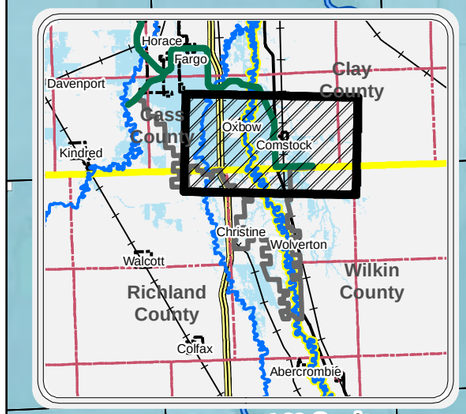

Control Structure

Eastern Tie-back Embankment

I-29 Grade Raise

Oxbow

OHB Ring Levee

Comstock

Cass County

Clay County

Pleasant Twp

Holy Cross Twp

Alliance Twp

Richland County

Walcott Twp

Eagle Twp

Wilkin County

Wolverton Twp

Deerhorn Twp

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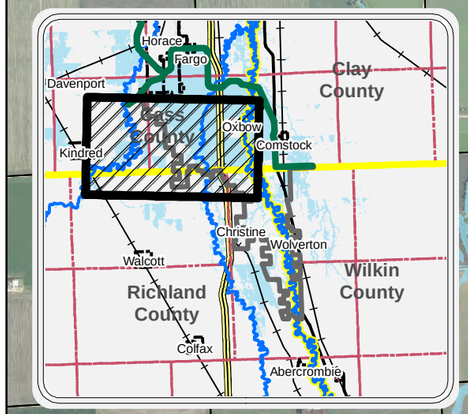

Cass County

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Clay County

Holy Cross Twp

Pleasant Twp

Wild Rice River

I-29 Grade Raise

Oxbow

OHB Ring Levee

Kindred

Richland County

Walcott Twp

Wolverton Twp

Wilkin County

Eagle Twp

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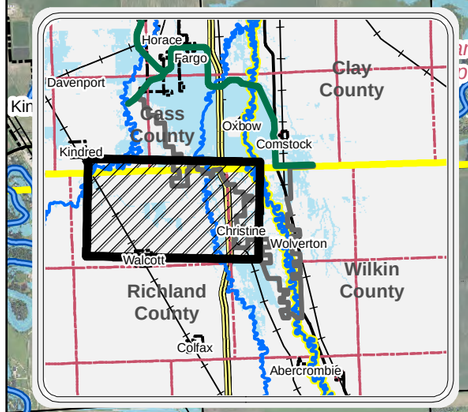

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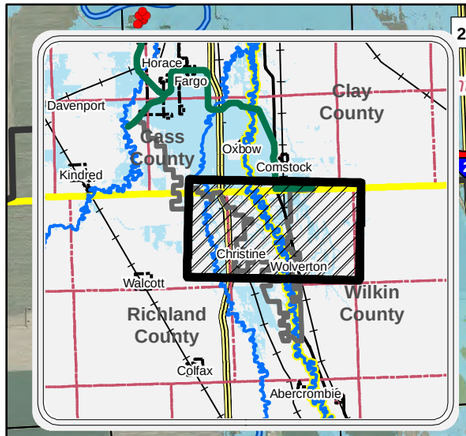

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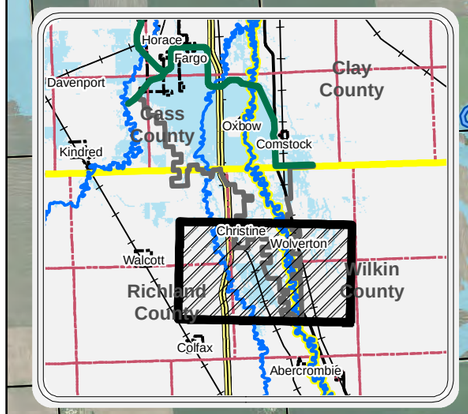

Christine

Wolverton

Wolverton Twp

186

30

184

75

Richland County

Eagle Twp

Wilkin County

29

29

Colfax Twp

Roberts Twp

151

39

180

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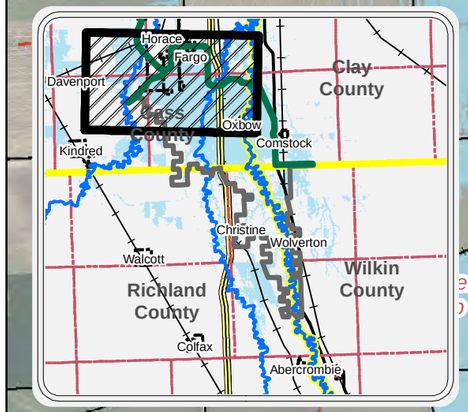

Utilities

Communication Lines
- Dakota Carrier Network - Field Located
- AT&T - Field Located
- Cable One - Digitize
- Century Link - Field Located
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- Century Link - Proposed
- Century Link - Digitize
- Dakota Carrier Network - Digitize
- Midcontinent - Field Located
- Midcontinent - Digitize
- Red River Communications - Shapefile
- Red River Communications - Field Located
- Sprint - Digitize
- Sprint - Field Located

Electric Lines
- MPS - Field Located
- Otter Tail Power - Field Located
- Xcel - Field Located
- Xcel, OTP, Great River Et al - Digitize
- Cass County Electric - Field Located
- Cass County Electric - Non-Field Located
- Cass County Electric - Shapefile
- Minnkota - Field Located
- Minnkota - Non-Field Located
- Red River Co-Op Power - Shapefile
- WAPA - Field Located
- WAPA - Non-Field Located
- WAPA - Shapefile
- Xcel - Digitize

Water Lines
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- Cass Rural Water Users, Inc. - Digitize

Petroleum Lines
- NuStar - Field Located
- Cenex - Field Located
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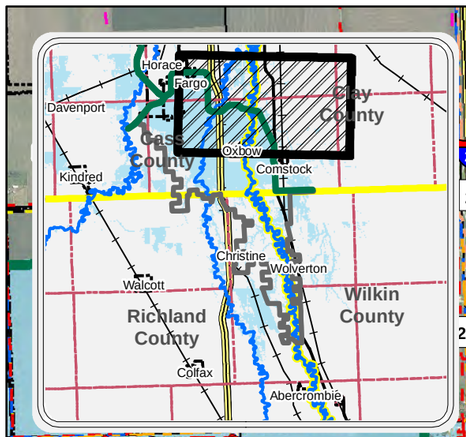

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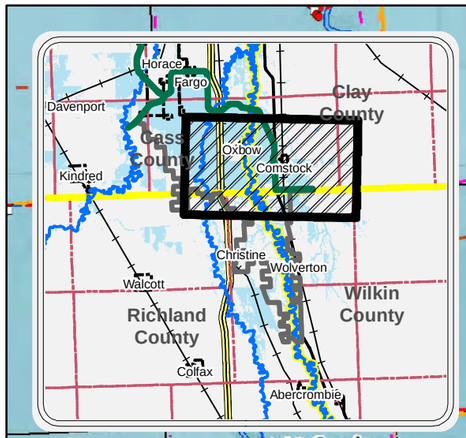

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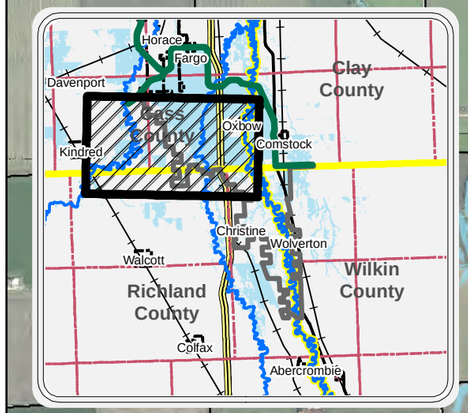

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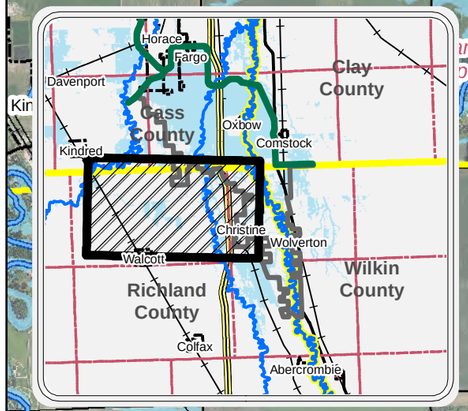

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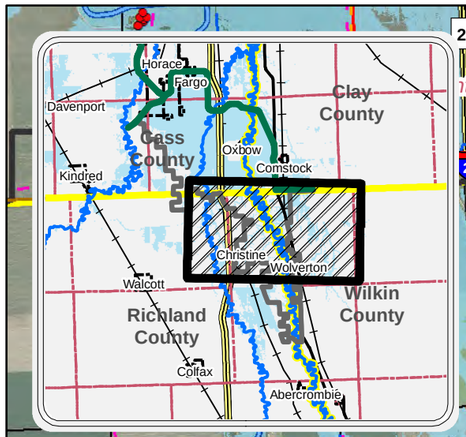
HMG



Clay County

Holy Cross Twp

Alliance Twp

Deerhorn Twp

Richland County

Walcott Twp

Eagle Twp

Wilkin County

Wolverton Twp

Christine

Wolverton

29 81 59 50 52 11 190 75 151 188 186 30

Utilities

Communication Lines

- Dakota Carrier Network - Field Located
- AT&T - Field Located
- Cable One - Digitize
- Century Link - Field Located
- Century Link - Non-Field Located
- Century Link - Proposed
- Century Link - Digitize
- Dakota Carrier Network - Digitize
- Midcontinent - Field Located
- Midcontinent - Digitize
- Red River Communications - Shapefile
- Red River Communications - Field Located
- Sprint - Digitize
- Sprint - Field Located

Electric Lines

- MPS - Field Located
- Otter Tail Power - Field Located
- Xcel - Field Located
- Xcel, OTP, Great River Et al - Digitize
- Cass County Electric - Field Located
- Cass County Electric - Non-Field Located
- Cass County Electric - Shapefile
- Minnkota - Field Located
- Minnkota - Non-Field Located
- Red River Co-Op Power - Shapefile
- WAPA - Field Located
- WAPA - Non-Field Located
- WAPA - Shapefile
- Xcel - Digitize

Water Lines

- Cass Rural Water Users, Inc. - Field Located
- Cass Rural Water Users, Inc. - Non-Field Located
- Cass Rural Water Users, Inc. - Digitize

Petroleum Lines

- NuStar - Field Located
- Cenex - Field Located
- Cenex - Non-Field Located
- Magellan - Field Located
- Magellan - Non-Field Located
- Xcel - Digitize
- Xcel - Field Located

All utility information is for informational purposes only.
Only approximate locations of utilities are shown.
All utilities MAY NOT be shown.

IMPACTED UTILITIES & PROJECT FEATURES
FM FLOOD RISK MANAGEMENT PROJECT

Created By: KMV Date Created: 02/21/18 Date Saved: 06/01/18 Date Exported: 06/01/18
Plotted By: tanner.schmidt Parcel Date: N/A Aerial Image: 2017 County NAIP SIDS Elevation Data: N/A
Horizontal Datum: NAD 1983 StatePlane North Dakota South FIPS 3302 Feet Vertical Datum: NAVD1988
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N W E S

0 1,750 3,500 7,000 Feet

1 in = 3,500 feet

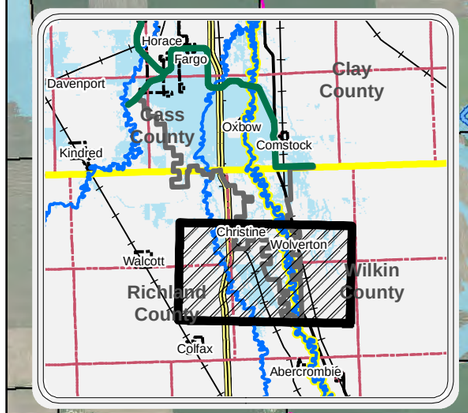
Legend

- Plan B Dam Alignment
- Ring Dike
- Analysis Boundary (Depth Dif. >0.1')
- 1-Percent Annual Chance Floodplain

Impacted Strctures

- Residential
- Non-Residential
- CITY LIMITS
- CIVIL TOWNSHIPS
- PLSS SECTIONS

HMG



Christine

Wolverton

Wolverton Twp

186

30

184

75

Richland County

Eagle Twp

Wilkin County

29

Colfax Twp

Roberts Twp

39

151

180

Utilities

Communication Lines
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- AT&T - Field Located
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- Century Link - Field Located
- Century Link - Non-Field Located
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Electric Lines
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- Xcel - Digitize
- Xcel - Field Located

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Only approximate locations of utilities are shown.
All utilities MAY NOT be shown.

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FM FLOOD RISK MANAGEMENT PROJECT

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N W E S

0 1,750 3,500 7,000 Feet

1 in = 3,500 feet

Legend
- Plan B Dam Alignment
- Ring Dike
- Analysis Boundary (Depth Dif. >0.1')
- 1-Percent Annual Chance Floodplain

Impacted Strctures
- Residential
- Non-Residential

- CITY LIMITS
- CIVIL TOWNSHIPS
- PLSS SECTIONS

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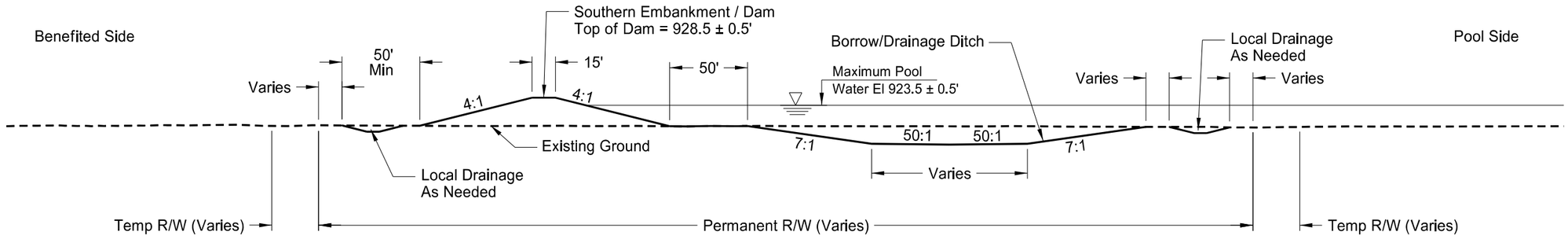
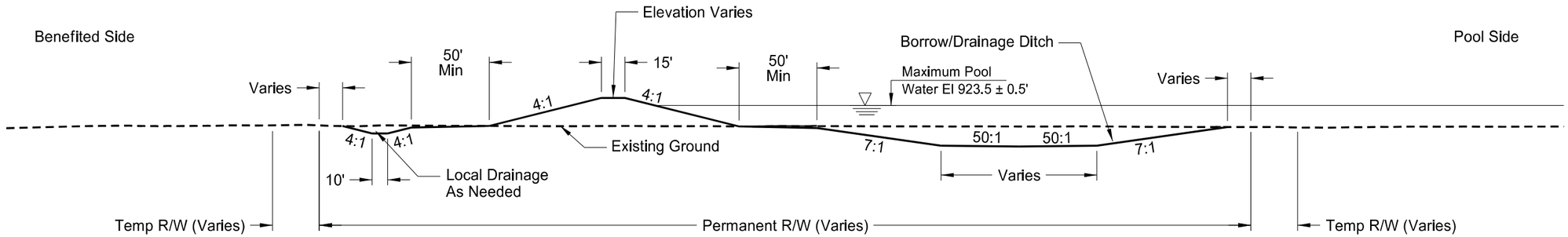
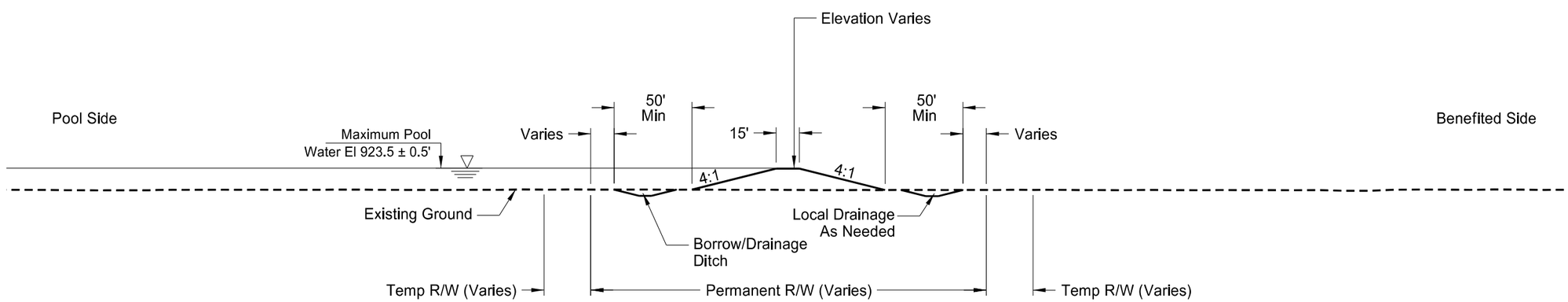


Dam / Southern Embankment
Typical Section



Eastern Tieback
Typical Section



Western Tieback
Typical Section

Southern Embankment: Plan B

Plan B Alignment
Diversion Alignment
Western Tieback
Eastern Tieback
Parcels

N
W E
S

0 0.25 0.5 1
Miles

HMG

Created By: enelson Date Created: 5/31/2018 Date Exported: 6/1/2018 Image: 2014/2015 County NAIP Elevation Data: NA
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Fargo-Moorhead Metropolitan Area Flood Risk Management Project

Federal Construction Placement - Southern Embankment

Schedule Assumes Federal Funding is Provided in FY17 and Continues Throughout the Construction Period

Prepared for Dam Safety / Preliminary Report submittal March 2018

Feature	Draft plans and specs available	Anticipated Final Plans and Specifications	Project Construction Period by Federal Fiscal Year (FY)										Notes
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
Diversion Inlet Structure (ND)		May-16 (actual)												Current contract states construction to be complete by 9/15/2020; vegetation establishment by 9/15/2021. Assume one year delay.
Land acquisition for Inlet Structure														
Wild Rice Control Structure (ND)	Jul-17	Dec-18												Assume award in 2019
Land acquisition for Wild Rice Structure														
I-29 Bridge/Raise (ND)	Apr-19	Apr-20												
Land acquisition for I-29														
Red River Control Structure	Nov-19	Apr-21												
Land acquisition for Red River Structure														
CR 81 Bridge/Grade raise	Jul-22	Apr-23												Included in Reach B
Land acquisition for CR 81														
ND Embankment Reach A (ND)	Jul-19	Apr-20												Inlet to Wild Rice
Land acquisition for Reach A														
ND Embankment Reach B (ND)	Jul-22	Apr-23												Wild Rice to Red River
Land acquisition for Reach B														
MN Embankment Reach C (MN)	Jul-21	Apr-22												East of Red River (MN Tie-Back)
Land acquisition for Reach C														
ND Embankment Reach D (ND)	Jul-20	Apr-21												Limited service spillway (Western Tie-Back)
Land acquisition for Reach D														
Other Activities														
Upstream Land Acquisition / Mitigation														Complete concurrent with construction and prior to project operation
Operation Manual														Final available after last contract complete
Project Operation														Project operation after construction and upstream land acquisition complete

Notes

Red shading indicates scheduled construction for each phase of the dam

Blue shading indicates scheduled design for each construction contract.

Green shading indicates land acquisition.

USACE fiscal year: 1 Oct-30 Sept

DRAFT

Property Rights Acquisition and Mitigation Plan v.2

March 16, 2018

This is a draft Property Rights Acquisition and Mitigation Plan and the Diversion Authority requests MDNR provide input and comments on the Plan.

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Preface

The Metro Flood Diversion Authority (Diversion Authority) has prepared this Property Rights Acquisition and Mitigation Plan to document the property rights acquisition and mitigation policies that will be followed for the Fargo-Moorhead (FM) Area Diversion Project (Project). This Property Rights Acquisition and Mitigation Plan has been drafted in coordination with the US Army Corps of Engineers (USACE), and in consultation with the North Dakota State Water Commission (NDSWC) and the Minnesota Department of Natural Resources (MDNR). Throughout this Property Rights Acquisition and Mitigation Plan, the Project is commonly referred to as the 'FM Area Diversion Project', but it should be noted that USACE, other agencies, and certain documents identify the Project as the 'Fargo-Moorhead Metro Flood Risk Management Project'.

It should also be noted that the Project being referenced in this Property Rights Acquisition and Mitigation Plan is the Project that the Diversion Authority has submitted to MDNR as part of a permit application. The Project is now considered "Plan B", and is intended to be consistent with the recommendations of the Governors' Task Force.

This Property Rights Acquisition and Mitigation Plan is intended to be a living document that will be reviewed and amended periodically as additional information and operations prompt updates.

This Property Rights Acquisition and Mitigation Plan contains information about the acquisition of property rights needed for the Project, and this plan consists of both property mitigation and environmental mitigation plans. This document is a compilation of a series of plans for a variety of topics. Collectively, the individual topics contained within this document serve as the comprehensive Property Rights Acquisition and Mitigation Plan for the Project.

Property Acquisition Philosophies

Mission

To acquire the property necessary for the Project, in compliance with Minnesota and North Dakota law and Federal guidelines and in accordance with the philosophy of being friendly, fair, and flexible to those whose property is required for the Project.

Overarching Property Acquisition Philosophies

- Follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (URA) (PL 91-646) as the basis for establishing the minimum standards for property acquisitions. The objectives of the URA are to:
    - Provide uniform, fair, and equitable treatment of persons whose real property is acquired or are displaced in connection with the Project.
    - Ensure relocation assistance is provided to displaced persons to lessen the emotional and financial impact of displacement.
    - Ensure no individual or family is displaced unless decent, safe, and sanitary housing is available within the displaced person's financial means.
- Work to be friendly, fair, and flexible with those whose property is being acquired and in facilitating the acquisition and relocation process.
- Use Eminent Domain as a last resort measure to acquire the necessary property.
- Acquisition costs will stay within the Project's annual budget.
- Property acquisition program will comply with Minnesota and North Dakota law, the URA, permit requirements, interagency agreements, and applicable project agreements and Memorandums of Understanding as each applies to the acquisition process for the Diversion Authority, the Cass County Joint Water Resource District (CCJWRD), and the Moorhead-Clay County Joint Powers Authority (MCCJPA). (Note: the MCCJPA is expected to be formed in 2018.)
- Program will acquire land impacted by the Project as opportunities arise with willing sellers.
- Payment for relocation benefits are a reimbursement of costs incurred by the displaced person(s).
- Negotiations: Negotiations are a necessary component of property acquisitions. Negotiation teams do their best to secure the property for the most equitable price possible and use Eminent Domain as a last resort. Property owners have been able to counter offer their appraised values and are encouraged to support these counter offers with factual data to support their position, this could include:
    - Updated comparable sales.
    - Updated cost approach information.
    - Updated financial information (for businesses).
    - Issues in the appraisal (i.e., square footage difference, missed features, incorrect data).
- Per the Project Partnership Agreement (PPA) executed on July 11, 2016, the federal government can also acquire land on behalf of the non-Federal sponsor.

Typical MN Property Acquisition Process

The Diversion Authority and the MCCJPA are responsible for the acquisition of real property in Minnesota for the Project. The parties will utilize the following steps for acquiring properties in Minnesota:

1. **Design Team (USACE or HMG)**
   a. Advises Program Management Consultant (PMC) of Right of Way (ROW) needs when the work limits are defined.
   b. PMC establishes a budget for the acquisition needs by Phase or Work Package.
2. **PMC-Land Management Team**
   a. Presents Land Acquisition Directive (with budget) to Diversion Authority's Finance Committee for approval.
   b. Submits the executed Land Acquisition Directive to MCCJPA.
   c. PMC assigns acquisition to a land acquisition firm (Land Agent).
   d. Land Agent firm accepts assignment, prepares proposed fee for review by PMC.
   e. PMC initiates task order amendment for Land Agent, obtains MCCJPA approval, executes documents with Land Agent, and provides fully executed documents to parties.
3. **Right of Entry**
   a. PMC identifies parcels which require Right of Entry (ROE) for boundary surveying.
   b. Legal prepares ROE request for access to conduct boundary survey.
   c. Land agents are assigned by PMC. The land agent assigned to each property manages ROE request and receipt forms, conducts initial follow-up calls, and notifies PMC when ROE is acquired.
4. **Survey Parcel**
   a. PMC conducts boundary survey and supplies initial certificate of survey exhibits to Land Agent (and appraiser).
5. **Notice of Intent to Acquire (NOI)**
   a. Land Agent sends property owner certified letter of NOI.
   b. Land Agent contacts property owner by phone to describe acquisition process, offers to meet.
6. **Parcel Appraisal**
   a. Appraiser, using certificate of survey exhibit, conducts appraisal following federal standards.
   b. Appraiser will be instructed to use the Minnesota definition of market value. This will include a before and after valuation for the property impacted by the acquisition. The before and after valuation method will capture damages to the property being taken and severance damages as applicable.
   c. Appraiser submits draft appraisal report for review (see Appraisal Review Plan for additional details).
   d. Upon appraisal review, Just Compensation value approved by MCCJPA (in accordance with Minnesota Statutes Chapter 117).
7. **Parcel Purchase Negotiation**
   a. Land Agent presents appraisal to property owner and makes initial offer of just compensation based on appraisal amount.
   b. Land agent informs property owner of the condemning authority's obligation to reimburse for the property owner's appraisal in accordance with Chapter 117.
   c. Land Agent identifies tenants, if any.
   d. Land Agent has 60 days (goal) to negotiate fair market value for acquisition and to negotiate relocation benefits, where applicable.
   e. Legal team develops Purchase Agreement based on Land Agent recommendation.

f. Land Agent meets with property owner to present Purchase Agreement; execute Purchase Agreement.
g. If outstanding terms, negotiate additional terms and seek MCCJPA approval regarding any additional negotiations.
h. PMC prepares final acquisition exhibits (Certificate of Survey) and supplies to legal team for inclusion in the closing documents.
i. Upon final approval of Purchase Agreement by property owner and MCCJPA, legal team prepares deed and additional documents required for closing.
j. Exhaust all reasonable negotiation opportunities via personal meetings and phone contacts.

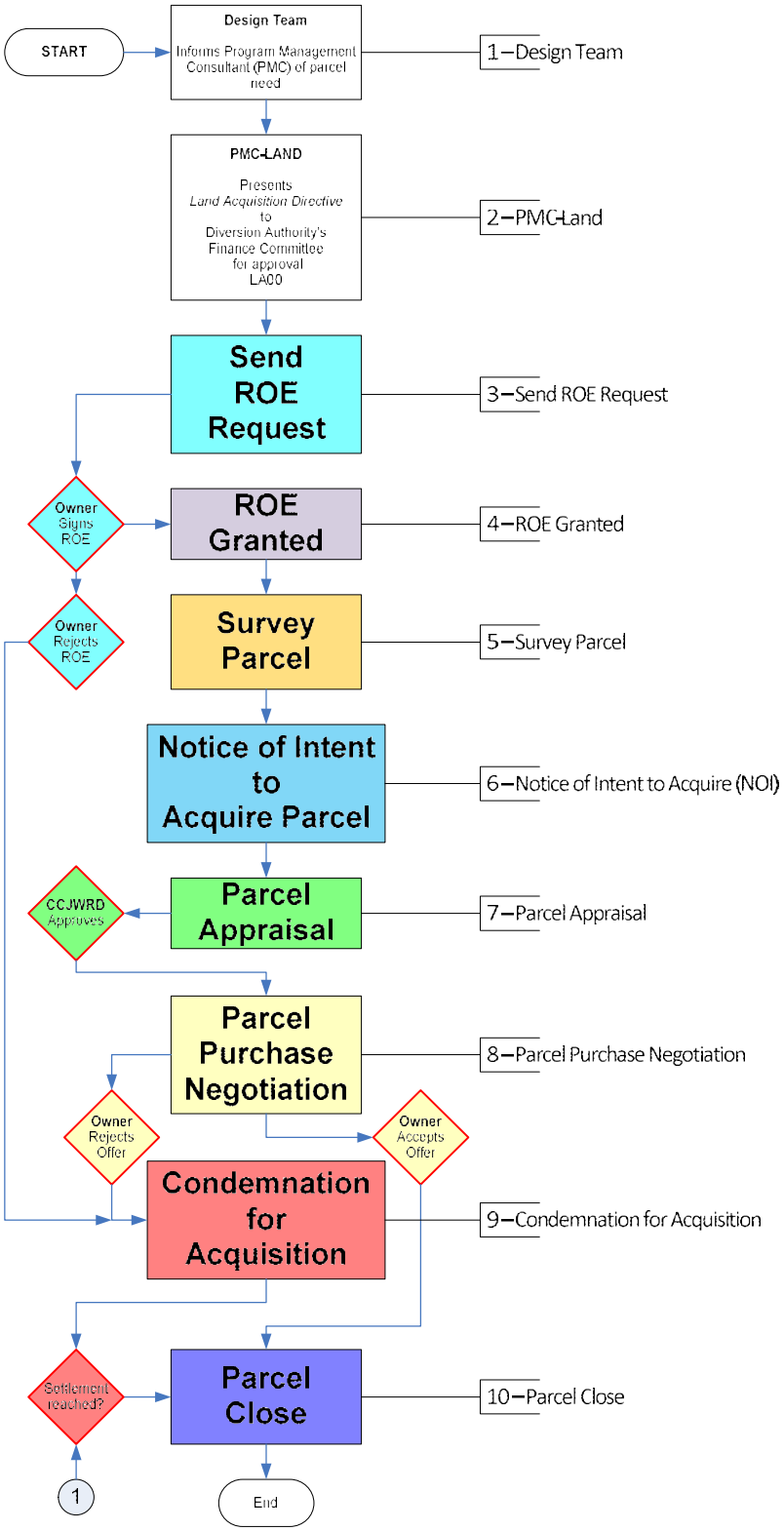
8. Parcel Close

a. The Title Company prepares partial mortgage releases, closing statement, 1099, and conducts the closing with owner.

9. Eminent Domain for Acquisition

a. If negotiation opportunities are exhausted and a negotiated acquisition is unlikely, Design Team, Land Agent, and PMC present negotiation details to MCCJPA.
b. If negotiated acquisition of the necessary property appears unlikely, MCCJPA notifies the City of Moorhead about the necessary property and the acquisition efforts to date.
c. If Moorhead concludes negotiated acquisition unlikely and judicial action will be necessary to acquire the property, legal team, in coordination with Design Team, Land Agent, and PMC, presents RESOLUTION OF NECESSITY and RESOLUTION OF OFFER TO PURCHASE for Moorhead's consideration and approval.
d. Upon approval of RESOLUTIONS by Moorhead, Land Agent presents RESOLUTIONS, along with final written offer to property owner and notifies owner of one-week deadline for acceptance.
e. If no acceptance, legal team starts an eminent domain action to acquire the necessary property.
f. Notice of intent to take possession is served by certified mail.
g. A hearing seeking title and possession will be held no less than 90 days following the notice of intent to take possession is served.
h. Before possession and title is transferred, the amount of the appraisal will be deposited with the district court.
i. Legal team continues negotiations with property owner or property owner's counsel throughout judicial process. Legal team engages property owner's counsel in discovery and pre-trial motions and otherwise prepares for trial.
j. The Project will not be completed until the property rights necessary for the operation of the Project have been acquired. Final certificate filed and recorded in accordance with Minn. Stat. § 117.205.
k. Following acquisition of the property through the judicial process, Diversion Authority, USACE, etc., may proceed with construction on parcel.

Workflow diagram summary presented below. Detailed workflow diagraph attached.



Typical ND Property Acquisition Process

The Diversion Authority and CCJWRD are responsible for the acquisition of real property. The parties will utilize the following steps for acquiring properties in North Dakota:

1. **Design Team (USACE, HMG, or P3 Developer)**
   a. Advises Program Management Consultant (PMC) of Right of Way (ROW) needs when the work limits are defined.
   b. PMC establishes a budget for the acquisition needs by Phase or Work Package.
2. **PMC-Land Management Team**
   a. Presents Land Acquisition Directive (with budget) to Diversion Authority's Finance Committee for approval.
   b. Submits the executed Land Acquisition Directive to CCJWRD.
   c. PMC assigns acquisition to a land acquisition firm (Land Agent).
   d. Land Agent accepts assignment, prepares proposed fee for review by PMC.
   e. PMC initiates task order amendment for Land Agent, obtains CCJWRD approval, executes documents with Land Agent, and provides fully executed documents to parties.
3. **Right of Entry**
   a. PMC identifies parcels which require Right of Entry (ROE) for boundary surveying.
   b. Legal prepares ROE request for access to conduct boundary survey.
   c. CCJWRD manages ROE request and receipt forms, conducts initial follow-up calls, and notifies PMC and Land Agent when additional follow-up is required.
   d. Land Agent conducts any necessary additional follow-ups to establish singular point of contact.
4. **Survey Parcel**
   a. PMC conducts boundary survey and supplies initial certificate of survey exhibits to Land Agent (and appraiser).
5. **Notice of Intent to Acquire (NOI)**
   a. Land Agent sends property owner certified letter of NOI.
   b. Land Agent contacts property owner by phone to describe acquisition process, offers to meet.
6. **Parcel Appraisal**
   a. Appraiser, using certificate of survey exhibit, conducts appraisal following federal standards.
   b. Appraiser will be instructed to use the North Dakota definition of market value. This will include a before and after valuation for the property impacted by the acquisition. The before and after valuation method will capture damages to the property being taken and severance damages as applicable.
   c. Appraiser submits draft appraisal report for review (see Appraisal Review Plan for additional details).
   d. Upon appraisal review, Just Compensation value approved by CCJWRD (in accordance with NDCC § 32-15-06.1).
7. **Parcel Purchase Negotiation**
   a. Land Agent presents appraisal to property owner and makes initial offer of just compensation based on appraisal amount.
   b. Land Agent has 60 days (goal) to negotiate fair market value for acquisition and to negotiate relocation benefits, where applicable.
   c. Legal team develops Purchase Agreement based on Land Agent recommendation.
   d. Land Agent meets with property owner to present Purchase Agreement; execute Purchase Agreement.

e. If outstanding terms, negotiate additional terms and seek CCJWRD approval regarding any additional negotiations.
f. PMC prepares final acquisition exhibits (Certificate of Survey) and supplies to legal team for inclusion in the closing documents.
g. Upon final approval of Purchase Agreement by property owner and CCJWRD, legal team prepares deed and additional documents required for closing.
h. Exhaust all reasonable negotiation opportunities via personal meetings and phone contacts.

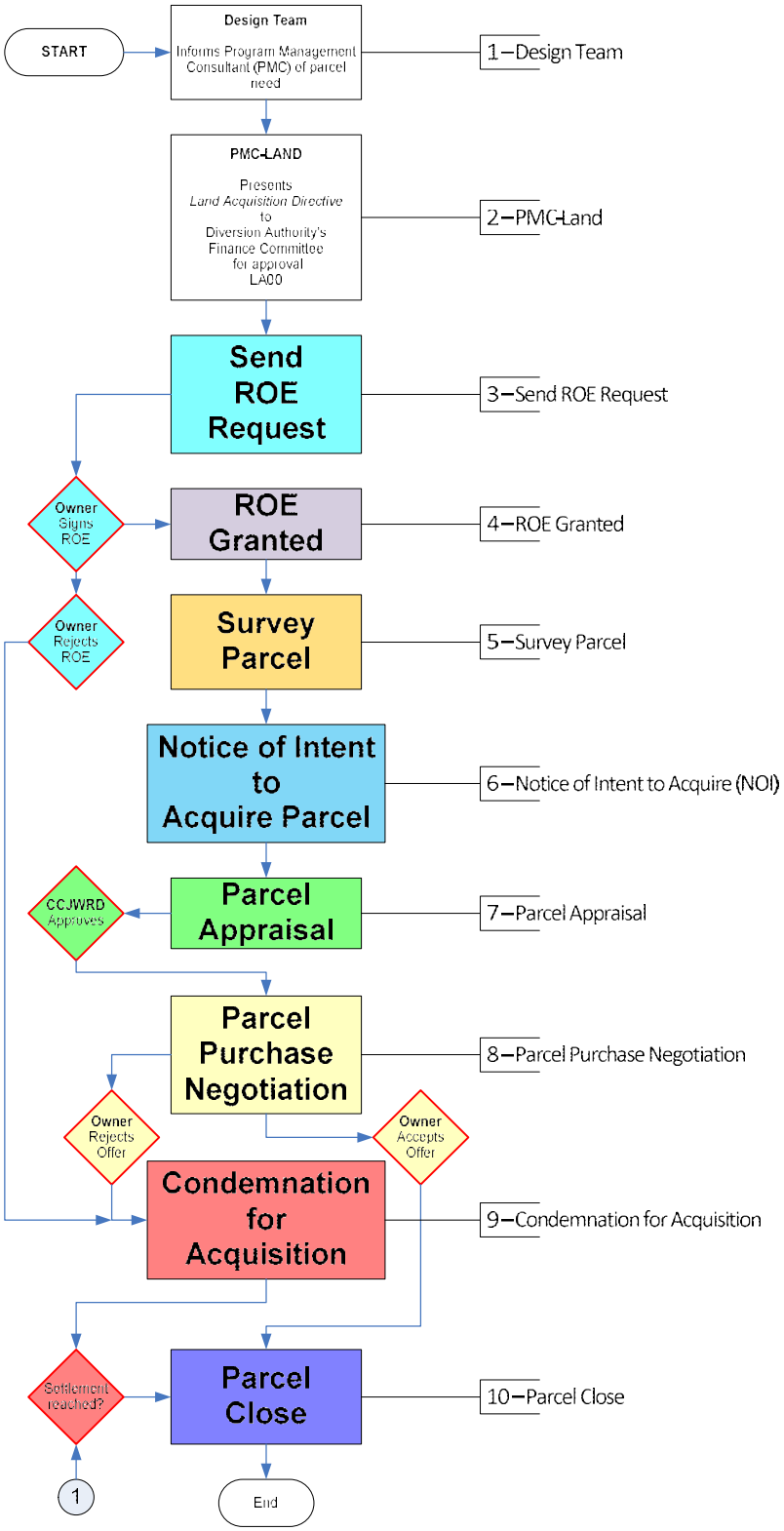
8. Parcel Close

a. The Title Company prepares partial mortgage releases, closing statement, 1099, and conducts the closing with owner.

9. Eminent Domain for Acquisition

a. If negotiation opportunities are exhausted and a negotiated acquisition is unlikely, Design Team, Land Agent, and PMC present negotiation details to CCJWRD.
b. If CCJWRD concludes negotiated acquisition unlikely and judicial action will be necessary to acquire the property, legal team, in coordination with Design Team, Land Agent, and PMC shall follow the process for water resource districts to exercise quick-take eminent domain that was adopted during the North Dakota 65th Legislative Assembly, and became effective August 1, 2017.
c. In summary, the process requires informal negotiations for a minimum of 60-days, and then the following steps:
    i. If no agreement after 60 days (minimum) of informal negotiations, send the appraisal and offer of just compensation to property owner by certified mail.
    ii. If no agreement, no sooner than 15 days, send to property owners by certified mail, an invitation to meet in person with CCJWRD representatives.
    iii. Meet with property owner, if desired.
    iv. If no agreement, no sooner than 30 days, send to property owner by certified mail, a notice that CCJWRD intends to take possession of the right of way within 30 days if there is not agreement regarding compensation.
    v. If no agreement, CCJWRD requests approval from Cass County Commission for approval to take possession of the right of way by utilizing quick take eminent domain.
    vi. Cass County Commission agrees to consider request from CCWJRD, places the topic on its agenda, and provides a 30-day notice to the property owner of the public meeting.
    vii. CCJWRD board chair files affidavit to Cass County Commission verifying that no reference or threat of quick take eminent domain was used during negotiations.
    viii. Cass County Commission holds public meeting and votes to approve use of quick take eminent domain by CCJWRD to take possession of right of way.
    ix. CCJWRD board chair files affidavit stating the CCWJRD fulfilled the negotiating steps and deposits the amount of the written offer with the clerk of district court.
    x. Legal team continues negotiations with property owner or property owner's counsel throughout judicial process. Legal team engages property owner's counsel in discovery and pre-trial motions and otherwise prepares for trial.
    xi. Following acquisition of the property through the judicial process, Diversion Authority, USACE, etc., may proceed with construction on parcel.

Workflow diagram summary presented below. Detailed workflow diagraph attached.



Appraisal Review Plan

Introduction

The Project will require acquisition of various land rights. Acquisitions will be conducted following the process defined in the Uniform Act (URA) (PL-91-646), the Code of Federal Regulations (49 CFR 24.104), along with any relevant state laws or regulations. The appraisals will be prepared in conformance with the Uniform Standards for Professional Appraisal Practice ("USPAP") and the standards of North Dakota or Minnesota (as appropriate).

Appraisal Review Process

Appraisal reviews are an important step in the land acquisitions process. As such, the Diversion Authority has adopted a plan to conduct formal appraisal reviews for each tract appraisal. The reviews shall be completed prior to beginning negotiations with the property owner. The following approach will be used for appraisal reviews for the Project.

1. The Diversion Authority has developed an independent appraisal review team. The team has identified qualified review appraisers and developed appraisal engagement and review tools, including the attached appraisal review certification report and appraisal review checklist.
2. The independent appraisal review team members, procedures, and tools have been reviewed and approved for adequacy by USACE as the Federal Agency overseeing the expenditure of federal funds.
3. The appraisal review team, using the guidance found in 49 CFR 24.102, will determine if informal value estimates or appraisals are required for the acquisition of each parcel.
4. To ensure consistency of methodology, quality assurance and confirmation, a Certified General Appraiser shall conduct a formal review on tract appraisals. The review appraiser will submit a signed cover letter certifying that each appraisal has been prepared in conformance with state (North Dakota or Minnesota) standards, and with the Uniform Standards of Professional Appraisal Practice (USPAP). The review submission will include a cover letter, the engagement documents, the tract appraisal report, and the review report.
5. Per the suggestion of the USACE Real Estate Division, USACE staff intends to review the appraisal file on 15 percent of the acquisitions. The review will include engagement documents provided to the tract appraiser, the tract appraisal report, and the review report.
6. USACE will be available to provide technical advice to the appraisal review team for those acquisitions that present unusually complex valuation issues.
7. The Diversion Authority shall attempt to use appraisers who have previously been vetted and approved by USACE Real Estate Division. When using new appraisers, the Diversion Authority appraisal review team shall determine if they are qualified to perform tract appraisals and for which property types. As a courtesy, the review team shall send the qualifications and sample appraisals of the new appraiser to USACE for awareness.
8. The Diversion Authority will track and document all appraisals and appraisal reviews (as well as acquisition documents) using a GIS-based system (ESRI Workflow Manager).

Attachments

- Appraisal Review Certification Report (sample, 3 pages)
- Appraisal Review Checklist (3 pages)

APPRAISAL REVIEW ANALYSIS and CERTIFICATION

PROPERTY OWNER: _____

PROPERTY OIN#: _____

Project:	FM Area Diversion Project
County:	
Parcel:	
PID #:	
Client:	[CCJWRD or MCCJPA]
Intended User:	[CCJWRD or MCCJPA]
Use/Purpose of Review:	To determine adequacy of appraisal for acquisition
Fee Owner:	
Property Rights Appraised:	
Property Address:	
Appraisal Format Used:	
Zoning:	
Highest and Best Use:	
Impacted Improvements:	
Tract Size:	
Appraisal By:	
Date of Valuation:	
Date of Report:	
Review Appraiser:	

VALUE CONCLUSION:

Fee Acquisition:

TOTAL TAKINGS & DAMAGES:

REVIEW APPRAISER'S CONCLUSIONS:

The report is compliant with USPAP and [North Dakota or Minnesota] Statutes, and the value conclusion is recommended for use as the basis for acquisition of the property.

Review Comments:

Scope of Work

The scope of this assignment includes USPAP and USFLA compliance, a review of the comparable sales data, reviewing of the appraisal for completeness, accuracy and appraisal methodology, and to develop an opinion with regard to the appropriateness of the appraisal report.

Reviewer Assumptions and Limiting Conditions:

- The Appraisal Review is based on information and data contained in the appraisal report which is the subject of the review. Data and information from other sources may be considered. If so, they are identified and noted as such.
- It is assumed that such data and information are factual and correct.
- The reviewer reserves the right to consider any new or additional data or information which may subsequently become available.
- Unless otherwise stated, all assumptions and limiting conditions contained in the appraisal report, which are the subject of this appraisal review, are also conditions of this review.

REVIEW APPRAISER'S CERTIFICATION:

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF:

The facts and data reported by the review appraiser and used in the review process are true and correct.

The analyses, opinions, and conclusions in this review report are limited only by the assumptions and limiting conditions stated in this review report, and are my personal, unbiased professional analyses, opinions, and conclusions.

I have no present or prospective interest in the property that is the subject of this report and I have no personal interest or bias with respect to the parties involved.

I have performed no other services, as an appraiser or in any other capacity, regarding the property that is the subject of the work under review within the three- year period immediately preceding acceptance of this assignment.

My compensation is not contingent upon an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this review report.

The appraisal review was made and the review report prepared in conformity with the Appraisal Foundation's Uniform Standards of Professional Appraisal Practice and the [INSERT STATE CODE REFERENCE].

I have completed the requirements of the continuing education program in the State of [INSERT STATE] in which I am licensed.

I do not authorize the out-of-context quoting from, or the partial reprinting of this review report. Further, neither all nor any part of this review shall be disseminated to the general public by use of media for public consumption or public communication without prior written consent of the review appraiser signing this report.

The appraisal report contains data that was obtained by appraiser from the county and other sources. I assume that this information is accurate and have not verified this information.

Date:

Review Appraiser Signature

[ND of MN] License No:

APPRAISAL REVIEW CHECKLIST

Reviewed By:
Appraiser:
Owner and Address:
OIN#:

	GENERAL INFORMATION	**N/A**	**Yes**	**No**
1	Has the type of appraisal development been prominently stated? Note that the use of the Departure Provision is not acceptable for Eminent Domain Purposes.	___	___	___
2	Has the purpose and reasoning for any Jurisdictional Exception been recognized in the development of the appraisal? Have the parts of USPAP that are voided by the Jurisdictional Exception been cited and has the legal authority justifying the action been disclosed?	___	___	___
3	Has the appraisal problem been identified and correctly interpreted?	___	___	___
4	Have the correct reporting format and reporting option been used and prominently stated?	___	___	___
5	Has the purpose of the appraisal been considered and identified?	___	___	___
6	Have the intended use and intended users of the appraisal been considered and identified?	___	___	___
7	Has the real property interest to be appraised been considered and identified?	___	___	___
8	Have the effective date of the appraisal and of the date of the report been considered and identified?	___	___	___
9	Have the proper definition of market value and its source been disclosed?	___	___	___
10	Has the link between the estimate of market value and specific exposure time been disregarded?	___	___	___
11	Has the scope of the appraisal been considered and adequately addressed?	___	___	___
12	Have all the extraordinary assumptions and limiting conditions been disclosed and considered?	___	___	___

13 Have all assumptions and limiting conditions that affect the analyses and conclusions been disclosed and considered? ___ ___ ___

14 Has an adequate history been provided for the subject; i.e., 10 years for the Uniform Standards, 5 years for North Dakota State standards or 3 years to meet USPAP requirements? ___ ___ ___

15 Has the owner or representative of the owner been afforded the right to accompany the appraiser on an inspection of the property? ___ ___ ___

BEFORE THE ACQUISITION

6 Has the larger parcel been properly and adequately described? ___ ___ ___

17 Has the highest and best use been properly and adequately analyzed? ___ ___ ___

18 Have existing land use regulations and probably modifications been properly and adequately analyzed? Identified and analyzed? ___ ___ ___

ACQUISITION

19 Has an adequate description of the part taken, including property rights acquired or encumbered been properly and adequately analyzed? ___ ___ ___

20 Has the impact of the acquisition / encumbrance on the remaining property been properly supported and explained? ___ ___ ___

AFTER THE ACQUISITION

21 Has the remaining larger parcel been properly and adequately described? ___ ___ ___

22 Has the highest and best use of the larger remaining parcel, as vacant and as improved, been properly and adequately analyzed? ___ ___ ___

VALUATION

23 Has all the information necessary to support the analysis, opinions and conclusions for all applicable valuation approaches, both before and after the acquisition, been properly developed and reported? ___ ___ ___

24 Has the exclusion of any of the usual valuation approaches been adequately explained and supported? ___ ___ ___

25	Have the strengths and weaknesses of all the applicable valuation approaches been reconciled into an indication of value?	___	___	___
26	Have any nominal damages to the remaining parcels been estimated either by the cost to cure method or through reasoning which fully explains those damages, and have any off-setting special benefits been fully explained and included?	___	___	___
27	Has an adequately explained and supported conclusion of the take including damages resulting from the acquisition / encumbrance been provided?	___	___	___
28	Does the reconciliation include consideration of any recent sale, offering, listing or option to purchase the subject property, as reported in the ten-year history?	___	___	___
29	Does the appraisal include a parcel summary or breakdown of the value of the parcel taken and or any improvements taken and any damages or special benefits to the remainder?	___	___	___

REPORTING REQUIREMENTS AND ACCEPTABILITY

30	Has an acceptable level of competence been demonstrated in the development, analysis and reporting of the appraisal?	___	___	___
31	Has an apparent ethical integrity been demonstrated in the development, analysis and reporting?	___	___	___
32	Has the ability to correctly employ recognized methods and techniques in the development of the appraisal been demonstrated in compliance with USPAP and the Uniform Act been included?	___	___	___
33	Has the ability to communicate the appraisal, in a manner that is sufficiently comprehensive and not misleading, been demonstrated?	___	___	___
34	Has the proper certification in compliance with USPAP been included?	___	___	___

Offer Presentation and Negotiations Process

Introduction

The Project will require acquisition of various land rights to approximately 1,260 parcels. Acquisitions will be conducted in accordance with the 'Typical ND/MN Property Acquisition Process', and following a federal process that is defined in the Uniform Act (URA) (PL-91-646) and in the Code of Federal Regulations (49 CFR 24). The process will also be in compliance with Uniform Standards for Professional Appraisal Practice ("USPAP") and the Uniform Appraisal Standards for Federal Land Acquisitions ("The Yellow Book").

Offer Presentation & Negotiation Process

As noted in the Typical Property Acquisition Process, an initial offer will be presented to the property owner based on the appraised value, which will commence negotiations between the property owner and a Land Agent. It is essential that the Diversion Authority establish limits for the Land Agents to work within when negotiating with property owners. The Land Agents shall serve as the primary point of contact with property owners, and Diversion Authority representatives should make efforts to encourage property owners to work through the process and through the Land Agents. The limits are essential to enabling timely, efficient, and successful completion of the property acquisitions for the Project. As such, the following process will be used for presenting offers and negotiating with property owners.

1. Initial Contact
    a. Initial Contact to the property owner will come from the acquiring entity (CCJWRD or MCCJPA). Initial Contact will introduce the Land Agent and direct all communication and negotiation to be conducted through the Land Agent.
2. Presentation of Appraisal
    a. Upon review and approval of the Appraisal, the Land Agent shall present the Appraisal to the Property Owner for review.
    b. Property Owner will have an opportunity to review the appraisal and point out any errors, omissions, or additional data for the Appraiser to consider in estimating value. Property Owner shall review and provide input within 14 days.
    c. Upon review of Property Owner input, the Appraiser should make any adjustments to the appraisal, if necessary, and re-submit the appraisal for approval by the acquiring entity.
3. Presentation of Offer
    a. Land Agent shall present the acquisition offer based on the appraisal.
    b. Land Agent shall keep open lines of communication with Property Owner and shall commence negotiations.

4. Negotiations
    a. Land Agents should have a goal of completing negotiations for acquisitions within 60 days. For acquisitions that involve relocation, the Land Agents should have a goal of completing negotiations within 90 days.
    b. The PMC Land Management Team and Land Agents are directed to secure the most equitable deal for the buyer.
    c. The PMC Land Management Team and Land Agents shall consider the following items when considering acquisitions and counteroffers:
        i. Appraisal discrepancy
        ii. Litigation avoidance
        iii. Cost avoidance
        iv. Precedence
        v. Timeframe/schedule
        vi. Good faith negotiations
    d. The PMC Land Management Team and Land Agents shall be authorized to reject counteroffers that are excessive, without basis, or otherwise outside the parameters presented above.
    e. Land Agents shall present their "most equitable" acquisition/counteroffers to the PMC Land Management Team for consideration. The PMC Land Management Team shall consider the acquisition/counteroffer and assist Land Agent in making a recommendation to CCJWRD or MCCJPA.
    f. In the event that acquisitions/counteroffers are extremely unique, the PMC Land Management Team shall coordinate a discussion on the acquisition with the acquiring entity chair, the Diversion Authority Executive Director, and designated leadership from the Diversion Authority.
    g. Acquisition offers and counteroffers shall be presented to the acquiring entity board one time.
    h. If negotiations fail to reach resolution after the timeframes noted above, acquiring entity board shall consider eminent domain action.
    i. Land Agents shall respond to all counteroffers presented Property Owners within 14 days.

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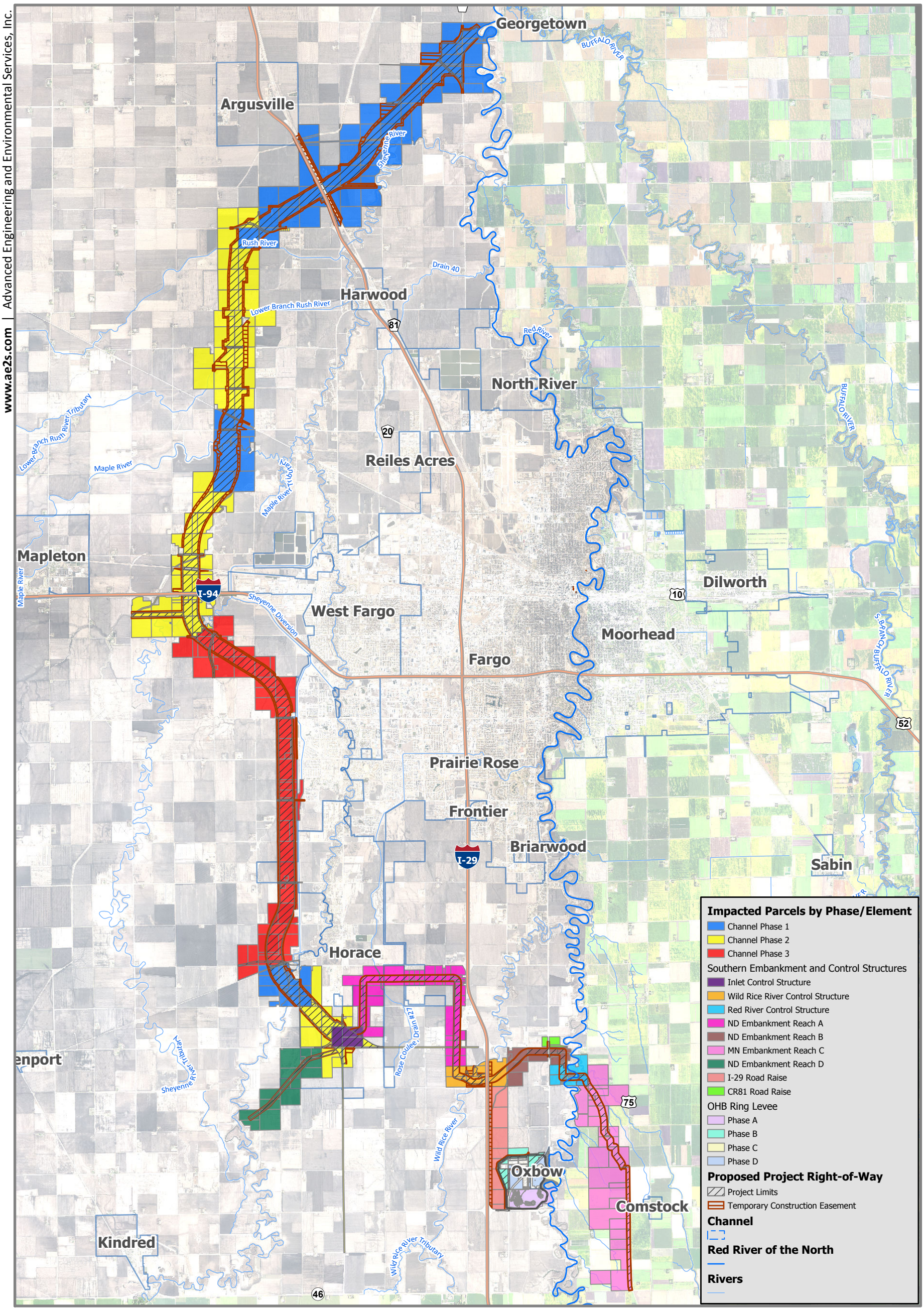

Information depicted may include data unverified by AE2S. Any reliance upon such data is at the user's own risk. AE2S does not warrant this map or its features are either spatially or temporally accurate.

Edited by: cwickenheiser | C:\Data\Projects\GIS Projects\FM Area Diversion\FMDiversion_PermitMap.aprx

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Miles

FM AREA FLOOD DIVERSION PROJECT
PARCELS IMPACTED BY PROJECT FOOTPRINT

Date: 3/16/2018

FM AREA DIVERSION PROJECT

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Property Acquisition Schedule[1]

Major Project Feature[2]	Location (State)	Work Limits Defined by Designer	Start Property Acquisition[3]	Notification to Property Owners[4]	Final Design Complete	Final Permit Application	Complete Property Acquisition[5]	Permit Issuance (Goal)[6]	Number of Parcels Impacted
Features Constructed by Diversion Authority using Public-Private-Partnership (P3)									
Diversion Channel Phase 1[7]	ND	June 2016	June 2016	July 2016	Nov 2019	Nov 2019	March 2019	Feb 2020	86
Diversion Channel Phase 2	ND	June 2017	June 2017	July 2017	Nov 2019	Nov 2019	July 2019	Feb 2020	67
Diversion Channel Phase 3	ND	June 2017	March 2018	April 2018	Nov 2020	Nov 2020	Feb 2020	Feb 2021	56
Features Constructed by USACE									
Diversion Inlet Control Structure	ND							July 2016 (actual)	3
Wild Rice Control Structure	ND	July 2017	April 2018	April 2018	Dec 2018	Dec 2018	Dec 2018	Feb 2019	6
I-29 Bridge / Road Raise	ND	April 2019	April 2019	April 2019	April 2020	April 2020	Dec 2019	July 2020	9[8]
Red River Control Structure	TBD	Nov 2019	Nov 2019	Nov 2019	April 2021	April 2021	July 2020	July 2021	24
CR 81 Road Raise	ND	July 2022	July 2022	July 2022	April 2023	April 2023	March 2023	July 2023	5[9]
ND Embankment Reach A	ND	July 2019	July 2019	July 2019	April 2020	April 2020	March 2020	July 2020	37
ND Embankment Reach B	ND	July 2022	July 2022	July 2022	April 2023	April 2023	March 2023	July 2023	14
MN Embankment Reach C	MN	July 2021	July 2021	July 2021	April 2022	April 2022	March 2022	July 2022	25
ND Embankment Reach D	ND	July 2020	July 2020	July 2020	April 2021	April 2021	March 2021	July 2021	18
ND Upstream Mitigation Area[10]	ND	Oct 2018	Oct 2018	Oct 2018	-	-	March 2025	May 2023	740
MN Upstream Mitigation Area	MN	Oct 2018	Oct 2018	Oct 2018	-	-	March 2025	May 2023	115

[1] Based on proposed P3 and USACE schedules from March 2018.
[2] See associated maps for location of main project features.
[3] The work limits defining property acquisition needs are generally expected at the 65 percent design level.
[4] Initial notification shall be a letter from the acquiring entity, introducing the Land Agent, who will follow-up with separate correspondence indicating an intent to acquire, the process for acquisition, and an offer to meet.
[5] Assume nine months duration to complete the property acquisition process.
[6] Assume permit can be issued within three months after final permit application.
[7] Diversion Channel Phase 1 includes Maple River & Sheyenne River Aqueduct Structures.
[8] Some of the parcels impacted by the I-29 Road Raise are also impacted by the Wild Rice Control Structure.
[9] Some of the parcels impacted by the CR 81 Road Raise are also impacted by ND Embankment Reach B.
[10] The property rights in the Upstream Mitigation Area will be acquired prior to the Project being operational, which is after the final segment of the embankment is constructed.

Early Residential Property Acquisition Program

Introduction

The Project requires acquisition of approximately 70 residential properties. The Diversion Authority aims to acquire these properties following a timeline based on design and construction schedules. That being said, and now that the Project Partnership Agreement has been executed with the Federal Government, the Diversion Authority will entertain requests for early acquisition from impacted residences. The intention of this program is to allow residents to be acquired early if they desire.

Early Acquisition Process

The following process will be used for early acquisition of impacted residences requiring acquisition or mitigation due to the Project.

- The Diversion Authority will approve an annual budget with a line item for 'early acquisitions'.
- The Diversion Authority will notify all impacted residences and make them aware of an opportunity for early acquisition.
- If impacted residents are interested in an early acquisition, they will be instructed to contact the acquiring entity (CCJWRD or MCCJPA), or the Program Management Consultant (PMC).
- The PMC will confirm that the interested residence is impacted by the Project and assess the budget availability.
- If the property is impacted, and if there is budget available, the PMC will recommend proceeding with acquisition of the residence.
- The acquisition will then commence following the 'Typical Property Acquisition Process'.
- These early acquisitions may be considered voluntary because the acquiring entity may not be able to demonstrate necessity if negotiations are unsuccessful.

Organic Farmland Acquisition Plan

Introduction

For typical farmland in the upstream mitigation area, the Project will need to obtain a flowage easement on the property, but for organic farmland, there is a chance that flooding could result in loss of organic certification, which requires three to five years to establish. As such, the Diversion Authority has developed a mitigation solution that allows for early mitigation of future impacts that may be caused by the Project.

Organic Farmland Acquisition Plan

The Diversion Authority will offer early acquisition of organic farmlands in the upstream mitigation area so that the organic farmers have the opportunity to establish organic certification on new lands outside of the upstream mitigation area well in advance of Project operations. Upon acquisition of existing organic farmland, the Diversion Authority will enter into a rental agreement with the current organic farm operator to rent the existing organic farmland during the timeframe in which the organic certification is being established on new lands, which is typically three to five years.

According to analysis completed by MDNR as part of the Minnesota Environmental Impact Statement, it is understood that there are four organic farming operations within the vicinity of the upstream mitigation area of the Project. According to the MDNR EIS, the farmer-reported total organic acreage is approximately 3,625 acres. Based on the configuration of the new Project and new alignment of the Southern Embankment, it is estimated that approximately 300 acres of organic farmland are located within the upstream mitigation area. Find attached a map showing the project configuration and the organic farmland sites.

The Diversion Authority will initiate the process offering to acquire the organic farmland, which starts with ordering an appraisal of the property. Representatives from the Diversion Authority will present the appraisal and initial purchase offer to the property owner for consideration and to begin negotiations. The purchase agreement will be structured to allow a 1031 type tax exchange transaction.

The Diversion Authority will attach a flowage easement to the property upon acquisition.

The Diversion Authority will engage its farmland management firm to develop a farmland rental agreement with the organic producer.

Ultimately, after allowing sufficient time for the organic producer to establish new organic certified farmland, the Diversion Authority will conduct a public sale of the property via its farmland management firm.

If the organic farmland owner declines to participate in this program, the typical mitigation approach will be used for the organic farmlands.

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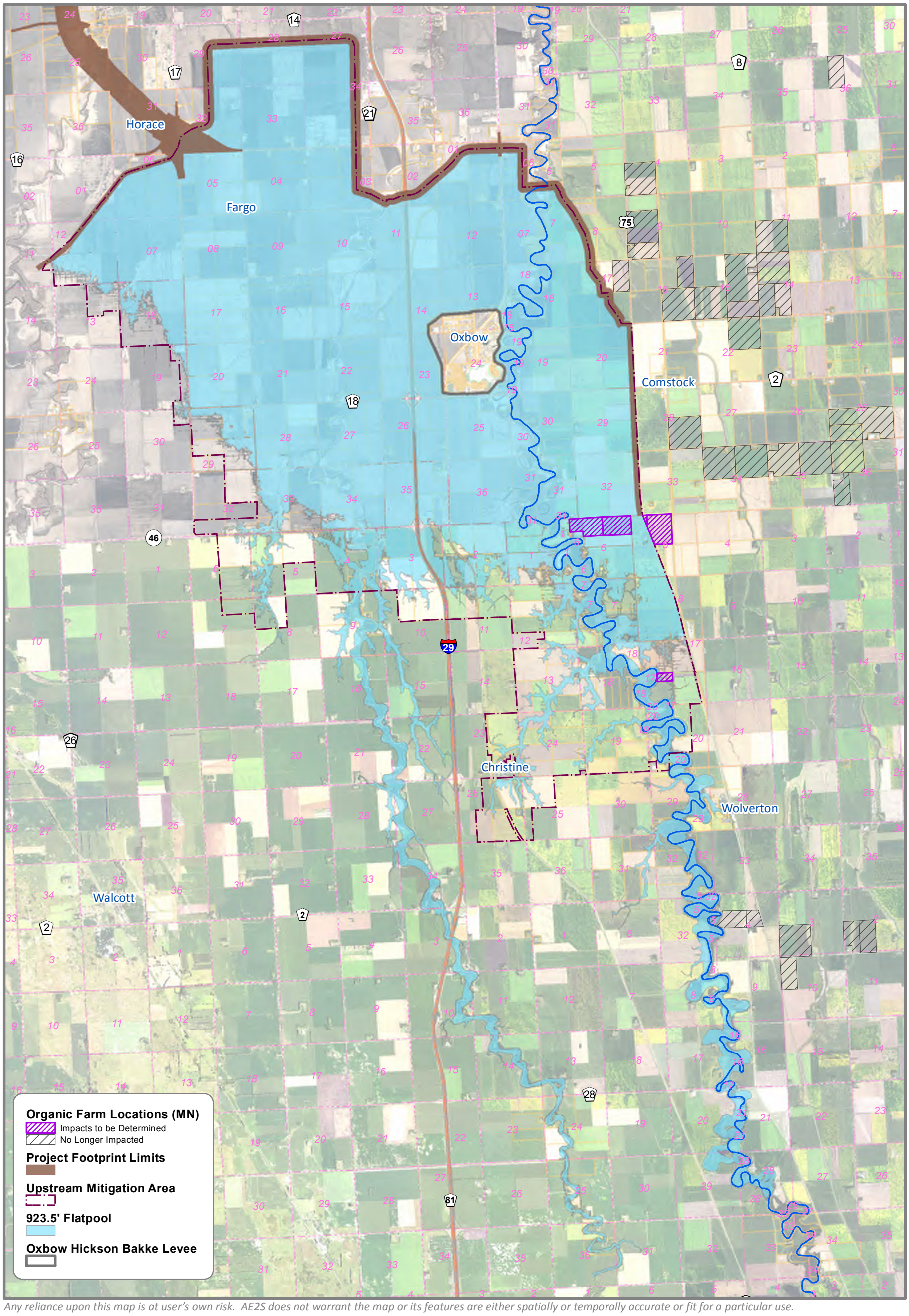
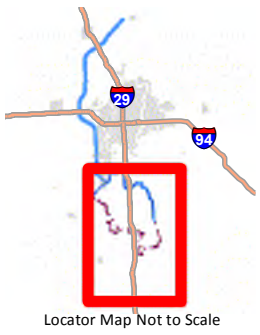


Any reliance upon this map is at user's own risk. AE2S does not warrant the map or its features are either spatially or temporally accurate or fit for a particular use.
All parcel acreages and legal descriptions shown hereon are based on County GIS data. Final acreages and legal descriptions to be determined by boundary survey.

Coordinate System: NAD 1983 StatePlane North Dakota South FIPS 3302 Feet | Edited by: cwickenheiser

C:\Data\Projects\GIS Projects\FM Area Diversion\Projects\Land Acquisition\Project Work Package\!Project Wide\Land Acquistion - Hardship\OrganicFarms.mxd

1.5 0.75 0 Miles



Locator Map Not to Scale

Minnesota Organic Farm Locations
FM Area Flood Diversion Project

Map Date: 3/13/2018

FM AREA DIVERSION PROJECT

AE2S

Disposal of Excess Property

Introduction

From time to time, there may be a variety of reasons for the Project to acquire more property than the minimum amount of property needed to construct the Project. For example, the property owner may request that the Project acquire a full parcel rather than just a portion of the parcel. Under the philosophy of being flexible and working with property owners, the Project should consider acquiring these properties, but the Project also needs a method to dispose of excess property. The disposal method must be fair, straightforward, and easy to exercise.

Disposal Process

In the event that the Project acquires more property than is necessary to construct and own the Project, it will follow the following process for disposal of the excess property.

- Identify the potential excess property and confirm that the property will not be required for construction, operation, or ownership of the Project.
- Once confirmed that the property is truly excess and unnecessary, the owner of the property (Diversion Authority, CCJWRD, or MCCJPA) shall notify its farmland management firm to commence a public sale of the property.
- The farmland management firm will arrange a public sale of excess properties.
- Public sales will be conducted regularly, perhaps as frequent as every six months, depending on needs.
- Public sales will be well advertised so that any interested party has sufficient opportunity to purchase the excess property.
- Any proceeds from sale of excess property will be deposited in the Diversion Authority accounts.

Mitigation of Properties in the Upstream Mitigation Area

Introduction

The FM Area Diversion Project includes a diversion channel, levees through town, and temporary retention of flood waters immediately upstream of the metro area. The temporary retention of flood waters will impact properties, and the Diversion Authority will be responsible for mitigating those impacts. Properties within the upstream mitigation area will require various forms of mitigation, including acquisition and removal of structures, elevating, dry flood proofing of structures, and acquisition of flowage easements. The plan for mitigating impacts in the upstream mitigation area has been developed based on requirements established jointly by USACE and FEMA, as well as the North Dakota State Water Commission (NDSWC) and the Minnesota Department of Natural Resources (MDNR).

The upstream mitigation area is defined using three areas: (1) Revision Reach Area, (2) Takings Analysis Area, and (3) Property Rights Area. The boundaries for these areas are generally defined as follows:

- **Revision Reach Area**: The Revision Reach Area is defined as part of the Conditional Letter of Map Revision (CLOMR) that will be developed following the USACE / FEMA Coordination Plan described below. In general, the Revision Reach Area is where the 100-year floodplain will be revised as a result of the Project. The Revision Reach is developed in coordination with FEMA.
- **Takings Analysis Area**: The Takings Analysis Area includes areas outside the Revision Reach where the Project impacts are between 0.5-feet to 0.1-feet during the 100-year flood event. The Takings Analysis Boundary is developed in coordination with USACE.
- **Property Rights Area**: The Property Rights Area is defined by using the maximum elevation of the spillway, which is expected to be no higher than 923.5 feet (NAV88).

USACE / FEMA Coordination Plan

USACE and FEMA developed a Coordination Plan (April 2015, attached) that outlines floodplain management requirements for the Project, including Conditional Letter of Map Revision (CLOMR) requirements for floodplain map revisions and Project mitigation.

The Coordination Plan defines the revision reach for the CLOMR as follows:

> "The extent of the revision is defined by an effective tie-in at the upstream and downstream limits for each flooding source. An effective tie-in is obtained when the revised base flood elevations from the post-project conditions model are within 0.5 feet of the pre-project conditions model at both the upstream and downstream limits."

The Coordination Plan defines Staging Area (i.e., Upstream Mitigation Area) Regulatory Mapping as follows:

> "The aerial extent of flood inundation required by the Project for operation in the Staging Area will be mapped as floodway in order to ensure that the required storage volume is available for the project during the one-percent annual chance flood event. Any additional flood inundation area beyond the extents of what is required by the project during the one-percent annual chance flood event will be mapped as floodplain in order to portray the elevated flood risk outside of the required staging area."

The Coordination Plan defines Mitigation of Project Impacts as follows:

> "The extent of mitigation of impacts caused by the Project is also defined by the revision reach."…. "The impacts caused by the Project on all insurable structures within the revision reach will be mitigated through agreed methods consistent with those specified by the National Flood Insurance Program (NFIP). For residential structures, these include elevation, relocation, buy-outs, and ring levees. For non-residential structures these include dry flood proofing, elevation, relocation, buy-outs, and ring levees."

Additionally, as part of the permitting process for the southern embankment, the NDSWC and MDNR have indicated the following requirements:

- NDSWC – Permit to Construct or Modify: "Evidence establishing a property right for all lands affected as a result of the final design elevation of the Limited Service Spillway". It is expected that the Limited Service Spillway will be constructed at elevation no greater than 923.5 feet (NAVD88). As such, for the purposes of this Mitigation Plan, a maximum elevation of 923.5 feet is used to define the area where the NDSWC will require the Diversion Authority to obtain property rights in North Dakota.
- MDNR – Public Waters Work and Dam Safety: "Minnesota will require property rights up to the water surface elevation at the maximum capacity of the dam…" NOTE: Based on hydraulic modeling and preliminary design for the new Project, the water surface elevation at the maximum capacity of the dam is expected to be 923.5 feet (NAVD88).

Structure Mitigation in the Upstream Mitigation Area

Impacts to structures in the upstream mitigation area will be mitigated following the criteria outlined below.

- NOTE: The references to "CLOMR approved hydraulic model" are for a future CLOMR that will be developed in coordination with FEMA.
- The CLOMR approved hydraulic model will be used to determine the flood water depth at the structure under a one-percent annual chance (100-year) flood event with project and under existing conditions.
- The CLOMR approved hydraulic model will be used to determine the Operating Pool (Floodway) in the upstream mitigation area.

- NOTE: Aerial photography of the upstream mitigation area will be taken before, during, and after flood events, and high-water marks will be surveyed to check and improve the hydraulic model for its use in the mitigation programs.
- The impacted structures have been classified into five mitigation categories.
    1. Category 1: If the structure is located within the floodway, it will be acquired via the typical acquisition process (see the Typical ND/MN Property Acquisition Process sections of the Mitigation Plan), and then removed from the floodway.
    2. Category 2: If the flood water depth at the structure is greater than or equal to two-feet, the structure will be acquired via the typical acquisition process, and then removed from the mitigation area.
    3. Category 3: If the flood water depth at the structure is between 0.5 foot and two-feet, and if the structure is outside the floodway and within the Revision Reach, the Diversion Authority will consider, with the property owner, non-structural measures for the structure as well as offer to acquire the structure via the typical acquisition process following an appraisal. Non-structural measures for residential structures may include elevation, relocation, or acquisition. Non-structural measures non-residential structures may include dry flood proofing, elevation, relocation, and acquisition. Wells and septic systems serving residences that will remain will be modified to prevent impacts from flooding. Each of these structures will be considered on a case-by-case basis, in coordination with the property owner.
    4. Category 4: If the flood water depth at the structure is less than 0.5-feet, and if the structure is outside the floodway and within the Revision Reach, the Diversion Authority will field verify the structure elevation via a topographical survey to confirm the impacts. The field verification will result in the production of a FEMA Elevation Certificate. If the field verification confirms that the structure is impacted (for the purposes of structure mitigation, an impact is defined as any total depth greater than 0.01-feet during a 100-year flood event), the Diversion Authority, with the property owner, will consider non-structural measures for the structure as well as offer to acquire the structure via the typical acquisition process following an appraisal. Non-structural measures for residential structures may include elevation, relocation, or acquisition. Non-structural measures non-residential structures may include dry flood proofing, elevation, relocation, and acquisition. Wells and septic systems serving residences that will remain will be modified to prevent impacts from flooding. Each of these structures will be considered on a case-by-case basis, in coordination with the property owner.
    5. Category 5: If the structure is located outside the Revision Reach, but within the Takings Analysis Area, the USACE will performed a takings analysis to determine if any impacts exist, and if the impacts are compensable.

Land Mitigation in the Upstream Mitigation Area

Impacts to land in the upstream mitigation area will be mitigated following the criteria outlined below.

- The CLOMR approved hydraulic model will be used to define the 'existing' and 'with-project' flood water depths and durations within the upstream mitigation area.
- The CLOMR approved hydraulic model will be used to determine the Operating Pool (Floodway) in the upstream mitigation area.
- The Diversion Authority (or its member entities) will obtain flowage easements on the following properties:
    - Properties within the Operating Pool (Floodway). This is a Federal requirement, and the flowage easement in this area will restrict all development. The Operating Pool (Floodway) is the area required for Project operation to mitigate downstream impacts. This area will be mapped as Floodway.
    - Properties within the Revision Reach Area, but outside of the Floodway. As noted above, the Revision Reach is defined through coordination with FEMA. Flowage easements in this area will permit development in accordance with floodplain development ordinances enforced by the local government agency and in accordance with FEMA floodplain development rules.
    - Properties outside the Revision Reach, but within the Property Rights Area, which includes properties with an elevation less than the elevation of the maximum pool elevation controlled by the Limited Service Spillway, which is expected to be no greater than 923.5 feet (NAV88). Flowage easements in this area will permit development in accordance with floodplain development ordinances enforced by the local government agency and in accordance with FEMA floodplain development rules.
    - For properties in the Takings Analysis Area, a takings analysis will be performed by USACE to determine if any impacts exist, and if the impacts are compensable.
    - The southern end of the flowage easement boundary along existing river channels will be limited to where the 923.5-foot elevation meets the existing 100-year flood elevation. This boundary will be used so the Diversion Authority is not obligated to obtain property rights within the existing river channels.
- The Dispute Resolution Board defined elsewhere in the Mitigation Plan provides a fair and independent process and mechanism for property owners who believe they were impacted by the Project to submit a claim of damages. The Dispute Resolution Board will be relied upon for property owners outside of the mitigation boundaries described in this section of the Mitigation Plan.

Attachments

- Upstream Mitigation Area – Structures
    - Upstream Structure Mitigation – Map
    - Structure Mitigation Summary by County – Table
    - Structure Mitigation Summary by Mitigation Category
    - Structure Mitigation Tables (CLOMR Listed Properties) (5 pages)
- Upstream Mitigation Area – Land Mitigation Areas Map (Flowage Easement Area Map)
- Existing and With-Project One-Percent Annual Chance (100-year) Floodplain Maps (2 pages)

Rustad
Clay County
Cass County
Oxbow
Comstock
Wilkin County
Christine
Wolverton
Richland County

16
21
16
36
36
17S
25
18
46
29
29
81
26
2
1
2
75

Legend

- Alignment Centerline (Plan B)
- Levee
- Revision Reach Area
- Takings Analysis Area

Upstream Structure Mitigation

Category, Structure Type

- Category 1, Residential
- Category 1, Non-Residential
- Category 2, Residential
- Category 2, Non-Residential
- Category 3, Residential
- Category 3, Non-Residential
- Category 4, Residential
- Category 4, Non-Residential
- Category 5, Residential
- Category 5, Non-Residential
- N/A

Category	Description	Structure Mitigation Approach
Category 1	Floodway	Acquisition
Category 2	Within Revision Reach & Total Depth 2' or Greater	Acquisition Likely
Category 3	Within Revision Reach & Total Depth 0.5' to 2'	Acquisition or Other Mitigation
Category 4	Within Revision Reach & Total Depth Less Than 0.5'	Field Verify, Mitigate as Required
Category 5	Outside Revision Reach & Within Takings Analysis Area	Takings Analysis

FM AREA DIVERSION PROJECT
UPSTREAM STRUCTURE MITIGATION

N
W E
S

0 0.6 1.2 2.4 Miles

Additional analysis is needed to determine the CLOMR Floodway. The structures in Category 1 are currently included in other categories.

FM AREA DIVERSION PROJECT

Created By: KMV Date Created: 02/28/18 Date Saved: 03/15/18 Date Exported: 03/15/18
Plotted By: kyle.volk Parcel Date: Varies Aerial Image: N/A Elevation Data: 2008 Lidar
Horizontal Datum: NAD 1983 StatePlane North Dakota South FIPS 3302 Feet Vertical Datum: NAVD1988
T:\Projects\17700\17738\ACWP\Structure_Review_Plan_B_2018_02_28.mxd

Upstream Mitigation Area - Structure Mitigation Summary by County **12-Mar-2018**

Location (County)	Acquisition	Acquisition Likely	Acquisition or Other Mitigation	Field Verify Elevation, Mitigate as Required	Takings Analysis
	Category 1	Category 2	Category 3	Category 4	Category 5
Sites / Parcels					
Cass County	TBD	76	13	12	1
Clay County	TBD	11	4	4	0
Richland County	TBD	7	6	31	3
Christine (City)	TBD	1	2	28	0
Wilkin County	TBD	3	2	13	2
Wolverton (City)	TBD	0	0	0	7
Residential Structures					
Cass County	TBD	49	7	18	1
Clay County	TBD	7	1	5	0
Richland County	TBD	0	2	31	3
Christine (City)	TBD	0	0	24	0
Wilkin County	TBD	0	0	12	2
Wolverton (City)	TBD	0	0	0	4
Non-Residential Structures					
Cass County	TBD	318	41	79	23
Clay County	TBD	55	41	36	0
Richland County	TBD	9	7	120	16
Christine (City)	TBD	1	2	34	0
Wilkin County	TBD	4	4	53	13
Wolverton (City)	TBD	0	0	0	8

Notes:

- The Upstream Mitigation Area analysis is bound by the limits of the CLOMR Revision Reach and the Takings Analysis Boundary.

- The Revision Reach Area is generally defined by those areas where the 100-year floodplain will be revised as a result of the Project. The Revision Reach is developed in coordination with FEMA

- The Takings Analysis Area is generally defined by those areas outside the Revision Reach where the Project impacts are between 0.5' to 0.1'. The Takings Analysis Boundary is developed in coordination with USACE.

- The database includes all identified structures and sites upstream of the Southern Embankment.

- The impacts caused by the Project on all insurable structures within the Revision Reach will be mitigated through agreed methods consistent with those specified by the National Flood Insurance Program (NFIP). Additional structure-by-structure analysis is required to quantify impacts caused by the Project and define the mitigation plan for categories where additional analysis is noted below.

- "Category 1" is based on structures / sites in the CLOMR floodway. Additional analysis is needed to determine the CLOMR Floodway. These structures are currently included in other categories. (Mitigation: Acquisition and removal)

- "Category 2" includes structures / sites outside the CLOMR floodway and within the CLOMR Revision Reach. Sites have at least one structure with a total depth impact of 2' or greater. Additional analysis is needed to define the mitigation plan. (Mitigation: Acquisition and removal likely, with potential exceptions)

- "Category 3" includes structures / sites outside the CLOMR floodway and within the CLOMR Revision Reach. Sites have at least one structure with a total depth impact of 0.5' to 2'. Additional analysis is needed to define the mitigation plan. (Mitigation: Acquisition or other mitigation)

- "Category 4'' includes structures / sites outside the CLOMR floodway and within the CLOMR Revision Reach. Sites have at least one structure with a total depth impact less then 0.5'. Additional analysis is needed to define the mitigation plan. (Mitigation: Field Verify Elevations, Mitigate as Required)

- ''Category 5'' includes properties outside the CLOMR Revision Reach and within the Takings Analysis Area. The USACE will conduct a Takings Analysis to determine if the impacts are compensable. (Mitigation: Takings Analysis)

Upstream Mitigation Area - Structure Mitigation Summary Tables

12-Mar-2018

Tables for total summation of properties & structures within the mitigation categories

Mitigation Category			*Category Description*	*Mitigation Sub-Category*
Category 1			Floodway	Floodway
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]	
Cass	0	0	0	
Richland [1]	0	0	0	
Christine	0	0	0	
Clay	0	0	0	
Wilkin [1]	0	0	0	
Wolverton	0	0	0	
Total	0	0	0	

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Category 2			Total Depth 2' + w/in Revision Reach	Total Depth 2' or Greater
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]	
Cass	49	318	76	
Richland [1]	0	9	7	
Christine	0	1	1	
Clay	7	55	11	
Wilkin [1]	0	4	3	
Wolverton	0	0	0	
Total	56	387	98	

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Category 3			Within Revision Reach & Total Depth _____	Total Depth 0.5' to 2'
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]	
Cass	7	41	13	
Richland [1]	2	7	6	
Christine	0	2	2	
Clay	1	41	4	
Wilkin [1]	0	4	2	
Wolverton	0	0	0	
Total	10	95	27	

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Category 4			Within Revision Reach & Total Depth _____	Total Depth 0.1' to 0.5'
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]	Total Depth 0.01' to 0.1'
Cass	18	79	12	Total Depth 0'
Richland [1]	31	120	31	
Christine	24	34	28	
Clay	5	36	4	
Wilkin [1]	12	53	13	
Wolverton	0	0	0	
Total	90	322	88	

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Category 5			Outside Revision Reach & within Takings Analysis Area	Outside RR & DD 0.1' to 0.5'
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]	Outside RR & DD 0.01' to 0.1'
Cass	1	23	1	Outside RR & DD 0'
Richland [1]	3	16	3	
Christine	0	0	0	
Clay	0	0	0	
Wilkin [1]	2	13	2	
Wolverton	4	8	7	
Total	10	60	13	

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Total			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	75	461	102
Richland [1]	36	152	47
Christine	24	37	31
Clay	13	132	19
Wilkin [1]	14	74	20
Wolverton	4	8	7
Total	166	864	226

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Tables for the breakdown of properties & structures within the mitigation category criteria

Floodway			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	0	0	0
Richland [1]	0	0	0
Christine	0	0	0
Clay	0	0	0
Wilkin [1]	0	0	0
Wolverton	0	0	0
Total	0	0	0

-Properties and structures within the floodway.

-Additional analysis is needed to determine the CLOMR Floodway. The structures in Category 1 are currently included in other categories.

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Total Depth 2' or Greater			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	49	318	76
Richland [1]	0	9	7
Christine	0	1	1
Clay	7	55	11
Wilkin [1]	0	4	3
Wolverton	0	0	0
Total	56	387	98

-Properties and structures with total depth of water 2' + within the revision reach.

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Total Depth 0.5' to 2'			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	7	41	13
Richland [1]	2	7	6
Christine	0	2	2
Clay	1	41	4
Wilkin [1]	0	4	2
Wolverton	0	0	0
Total	10	95	27

-Properties and structures with total depth of water 0.5' - 2' WITHIN the revision reach & OUTSIDE the floodway.

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Total Depth 0.1' to 0.5'			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	2	18	3
Richland [1]	0	2	1
Christine	0	1	1
Clay	1	10	1
Wilkin [1]	0	4	0
Wolverton	0	0	0
Total	3	35	6

-Properties and structures with total depth of water 0.1' - 0.5' WITHIN the revision reach & OUTSIDE the floodway.

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Total Depth 0.01' to 0.1'			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	0	3	1
Richland [1]	0	1	0
Christine	0	2	2
Clay	0	2	0
Wilkin [1]	0	2	1
Wolverton	0	0	0
Total	0	10	4

-Properties and structures with total depth of water 0.01' - 0.1' WITHIN the revision reach & OUTSIDE the floodway.

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Total Depth 0'			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	16	58	8
Richland [1]	31	117	30
Christine	24	31	25
Clay	4	24	3
Wilkin [1]	12	47	12
Wolverton	0	0	0
Total	87	277	78

-Structures with no inundation BUT WITHIN the revision reach & OUTSIDE the floodway.

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Outside RR & DD 0.1' to 0.5'			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	0	1	1
Richland [1]	0	6	2
Christine	0	0	0
Clay	0	0	0
Wilkin [1]	0	11	2
Wolverton	2	7	7
Total	2	25	12

-Properties and structures with additional inundation of 0.1' - 0.5' OUTSIDE the revision reach but WITHIN the takings analysis area.

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Outside RR & DD 0.01' to 0.1'			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	0	0	0
Richland [1]	0	1	1
Christine	0	0	0
Clay	0	0	0
Wilkin [1]	0	0	0
Wolverton	0	0	0
Total	0	1	1

-Properties and structures with additional inundation of 0.01' - 0.1' OUTSIDE the revision reach but WITHIN the takings analysis area.

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Outside RR & DD 0'			
County/ City	Residential Structures[2]	Non-Residential Structures[2]	Sites/ Parcels[3]
Cass	1	22	0
Richland [1]	3	9	0
Christine	0	0	0
Clay	0	0	0
Wilkin [1]	2	2	0
Wolverton	2	1	0
Total	8	34	0

-Structures with no additional inundation (have same inundation as existing conditions) OUTSIDE the revision reach but WITHIN the takings analysis area.

[1] County sums do not include city numbers within the county
[2] Individual structure impact; Independent of site/parcel
[3] Overall site impact, based on most impacted structure for each site

Upstream Mitigation Area - Site Structure Summary (Preliminary CLOMR Listed Properties)

12-Mar-2018

Additional analysis is needed to determine the CLOMR Floodway. The structures in Category 1 are currently included in other categories.

					Totals	1030	166	864	0	0	56	387	10	95	90	322	10	60
OID	Parcel_ID	Name	City/ County	State		Total Structures	Total Res.	Total Non-Res.	Category 1		Category 2		Category 3		Category 4		Category 5	
									Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.
250	15.006.4701	BYE KENNETH	Clay	MN		8	1	7	TBD	TBD	1	7	0	0	0	0	0	0
251	15.007.1100	DAHLSTROM LARRY	Clay	MN		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
254	15.008.2301	WAGENMANN DAVID A & LINDA D	Clay	MN		4	1	3	TBD	TBD	1	3	0	0	0	0	0	0
1635	15.031.1801	BUTH BRAD & WENDY	Clay	MN		4	1	3	TBD	TBD	0	0	0	0	1	3	0	0
1665	15.029.3002	ROOD LAUREN	Clay	MN		1	1	0	TBD	TBD	0	0	1	0	0	0	0	0
1689	15.019.3400	UELAND RHODA K	Clay	MN		19	1	18	TBD	TBD	1	18	0	0	0	0	0	0
1793	15.029.3003	LIVDAHL THOMAS W & LAURIE K	Clay	MN		32	0	32	TBD	TBD	0	1	0	25	0	6	0	0
1794	15.030.4100	WILLEM ERNEST E	Clay	MN		9	1	8	TBD	TBD	0	0	0	5	1	3	0	0
1795	15.030.4101	WILLEM RICHARD & JUDITH & C/O ERNEST WILLEM	Clay	MN		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
1805	15.030.4701	STATTELMAN NICHOLAS	Clay	MN		1	0	1	TBD	TBD	0	0	0	1	0	0	0	0
1824	15.031.4002	NESS LARRY & JUDITH	Clay	MN		4	1	3	TBD	TBD	0	0	0	0	1	3	0	0
1826	15.031.4002	NESS LARRY & JUDITH	Clay	MN		11	0	11	TBD	TBD	0	1	0	9	0	1	0	0
1834	15.031.4401	BARNARD MICKI	Clay	MN		6	1	5	TBD	TBD	0	0	0	0	1	5	0	0
1841	15.019.4500	NELSON PHYLLIS M	Clay	MN		7	1	6	TBD	TBD	1	6	0	0	0	0	0	0
1868	15.030.4710	UELAND RHODA K	Clay	MN		3	1	2	TBD	TBD	1	2	0	0	0	0	0	0
1877	15.020.4400	C-W VALLEY COOP & C/O CURT BJERTNESS	Clay	MN		16	0	16	TBD	TBD	0	0	0	1	0	15	0	0
9169	15.007.1250	BINGER KEVIN L & KENDRA D	Clay	MN		8	0	8	TBD	TBD	0	8	0	0	0	0	0	0
9170	15.007.1251	BINGER KEVIN L & KENDRA D	Clay	MN		3	1	2	TBD	TBD	1	2	0	0	0	0	0	0
9234	15.019.1001	CROWE ROBERT C	Clay	MN		7	1	6	TBD	TBD	1	6	0	0	0	0	0	0
1237	22-006-0600	NESS/DAVID ALAN	Wilkin	MN		5	1	4	TBD	TBD	0	0	0	0	1	4	0	0
1238	22-006-0800	NESS/TIMOTHY A	Wilkin	MN		10	1	9	TBD	TBD	0	0	0	0	1	9	0	0
1239	22-006-0800	NESS/TIMOTHY A	Wilkin	MN		2	0	2	TBD	TBD	0	0	0	0	0	2	0	0
1251	22-006-0700	ABRAHAMSON/SCOTT & SHERI	Wilkin	MN		5	1	4	TBD	TBD	0	0	0	0	1	4	0	0
1252	22-101-0310	KRAGERUD/KEITH & NORMA	Wilkin	MN		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
1267	22-005-0300	BLILIE/KELLY S & STEFANIE	Wilkin	MN		5	1	4	TBD	TBD	0	0	0	0	1	4	0	0
1294	22-007-0400	ISRAELSON/DAVID	Wilkin	MN		6	0	6	TBD	TBD	0	1	0	2	0	3	0	0
1297	22-008-0110	ISRAELSON/DAVID & FRANK	Wilkin	MN		2	0	2	TBD	TBD	0	0	0	0	0	2	0	0
1305	22-007-0610	CITIMORTGAGE, INC	Wilkin	MN		3	1	2	TBD	TBD	0	0	0	1	1	1	0	0
1307	22-018-0120	NORDEN/KYLE R & EMILY	Wilkin	MN		5	1	4	TBD	TBD	0	2	0	0	1	2	0	0
1312	22-017-0500	JOHNSON/PAUL L & LILA	Wilkin	MN		5	0	5	TBD	TBD	0	0	0	0	0	5	0	0
1314	22-017-0520	JACOBS/THOMAS & SUSAN	Wilkin	MN		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
1315	22-017-0700	NESS/JAMES A	Wilkin	MN		3	0	3	TBD	TBD	0	0	0	0	0	3	0	0
1318	22-020-0100	HANSON/ROSE T	Wilkin	MN		1	0	1	TBD	TBD	0	0	0	1	0	0	0	0
1324	22-029-0110	HOHENSTEIN/JOSEPH E & SARA J	Wilkin	MN		4	1	3	TBD	TBD	0	0	0	0	0	0	1	3
8527	22-101-0405	THISETH/ANDERS & CAROL/TRUSTEE	Wilkin	MN		4	1	3	TBD	TBD	0	1	0	0	1	2	0	0
8528	22-101-0305	KRAGERUD/JACQUELINE M	Wilkin	MN		3	1	2	TBD	TBD	0	0	0	0	1	2	0	0
8798	22-029-0200	NELSON/DONALD M	Wilkin	MN		11	1	10	TBD	TBD	0	0	0	0	0	0	1	10
9153	22-017-0510	RUFER/MIKE F & DARLA L	Wilkin	MN		2	0	2	TBD	TBD	0	0	0	0	0	2	0	0
9157	22-020-0200	HANSON/NILS C	Wilkin	MN		9	2	7	TBD	TBD	0	0	0	0	2	7	0	0
8807	31-028-0230	GROSZ/JACOB L/& HAILEY L VOLD	Wolverton	MN		3	1	2	TBD	TBD	0	0	0	0	0	0	1	2
8808	31-028-0240	MITDAL/RONALD F	Wolverton	MN		1	1	0	TBD	TBD	0	0	0	0	0	0	1	0
8818	31-028-0340	WILKIN COUNTY	Wolverton	MN		1	0	1	TBD	TBD	0	0	0	0	0	0	0	1
8825	31-724-0330	MAESSE/KEVIN & SANDRA	Wolverton	MN		1	0	1	TBD	TBD	0	0	0	0	0	0	0	1
8826	31-724-0320	OLTHOFF/STEPHEN & MARY ANN	Wolverton	MN		2	1	1	TBD	TBD	0	0	0	0	0	0	1	1
8829	31-050-0250	GRUENBERG/MARY B	Wolverton	MN		1	0	1	TBD	TBD	0	0	0	0	0	0	0	1
8834	31-050-0270	ZIBELL/GEOFFREY A & HEATHER A	Wolverton	MN		3	1	2	TBD	TBD	0	0	0	0	0	0	1	2

Upstream Mitigation Area - Site Structure Summary (Preliminary CLOMR Listed Properties)

12-Mar-2018

Additional analysis is needed to determine the CLOMR Floodway. The structures in Category 1 are currently included in other categories.

					Totals	1030	166	864	0	0	56	387	10	95	90	322	10	60
OID	Parcel_ID	Name	City/ County	State		Total Structures	Total Res.	Total Non-Res.	Category 1		Category 2		Category 3		Category 4		Category 5	
									Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.
818	57-0000-10236-020	LAWRENCE & SUSAN RICHARD LIVING TRUST ETAL	Cass	ND		7	0	7	TBD	TBD	0	7	0	0	0	0	0	0
819	57-0000-10236-030	CASS RURAL WATER USERS DISTRICT	Cass	ND		2	0	2	TBD	TBD	0	2	0	0	0	0	0	0
820	57-0000-10237-000	WAYNE C JOHNSON	Cass	ND		6	1	5	TBD	TBD	1	5	0	0	0	0	0	0
825	57-0000-10240-020	MARCELLIN O OR BARBARA A SAUVAGEAU LE	Cass	ND		2	1	1	TBD	TBD	1	1	0	0	0	0	0	0
826	57-0000-10241-020	LEO & BARBARA DUBORD	Cass	ND		11	1	10	TBD	TBD	1	10	0	0	0	0	0	0
827	57-0000-10241-030	DOROTHY DUBORD LE	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
829	57-0000-10244-000	ORTEN B & SANDRA A BRODSHAUG	Cass	ND		3	1	2	TBD	TBD	1	2	0	0	0	0	0	0
831	57-0000-10245-010	JOHN LOFFELMACHER	Cass	ND		11	1	10	TBD	TBD	1	10	0	0	0	0	0	0
837	57-0000-10264-000	DENNIS A & MARY JANE HANSON	Cass	ND		3	1	2	TBD	TBD	0	0	1	2	0	0	0	0
839	57-0000-10266-010	JUEL E MUELLER	Cass	ND		4	0	4	TBD	TBD	0	0	0	2	0	2	0	0
840	57-0000-10276-000	ORTEN B & SANDRA A BRODSHAUG	Cass	ND		5	1	4	TBD	TBD	1	4	0	0	0	0	0	0
856	57-0000-10346-000	ORTEN B & SANDRA A BRODSHAUG	Cass	ND		12	1	11	TBD	TBD	1	11	0	0	0	0	0	0
858	57-0000-10350-017	LELONNIE & WILLIAM R GRAHAM	Cass	ND		5	1	4	TBD	TBD	0	3	1	1	0	0	0	0
867	57-0000-10412-000	SHERRY A COLEHOUR REVOCABLE LIVING TRUST ETAL	Cass	ND		3	1	2	TBD	TBD	0	0	0	0	1	2	0	0
872	57-0400-00090-000	ALLEN M & DIANE M RICKER	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
873	57-0400-00100-000	ALLEN M & DIANE M RICKER	Cass	ND		1	1	0	TBD	TBD	1	0	0	0	0	0	0	0
875	57-0400-00120-000	ALLEN M & DIANE M RICKER	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
877	57-0700-00010-000	GLENN M RHEAULT	Cass	ND		3	1	2	TBD	TBD	1	2	0	0	0	0	0	0
1885	57-0000-10211-060	BRIAN M & KELLY L DUCHSCHERER	Cass	ND		2	0	2	TBD	TBD	0	2	0	0	0	0	0	0
1890	57-0000-10217-030	ARTHUR MATHISON REVOCABLE TRUST ETAL	Cass	ND		5	0	5	TBD	TBD	0	0	0	4	0	1	0	0
1891	57-0000-10217-040	RODNEY A & CHERIE K MATHISON	Cass	ND		5	1	4	TBD	TBD	0	0	0	2	1	2	0	0
1893	57-0000-10212-011	JDC BABES ADDITION LLC	Cass	ND		4	0	4	TBD	TBD	0	4	0	0	0	0	0	0
1898	57-0000-10218-030	RYAN HANSON	Cass	ND		6	1	5	TBD	TBD	1	4	0	1	0	0	0	0
1899	57-0000-10219-020	MATTHEW W & KERRI A LONGTINE	Cass	ND		5	1	4	TBD	TBD	0	2	0	0	1	2	0	0
1906	57-0000-10271-000	JAMES P SABO	Cass	ND		6	1	5	TBD	TBD	1	5	0	0	0	0	0	0
1912	57-0000-10246-020	DARWIN W & SANDRA J DUVAL	Cass	ND		14	1	13	TBD	TBD	1	13	0	0	0	0	0	0
1914	57-0000-10274-020	GEORGE J & SHARON A RICHARD ETAL	Cass	ND		17	1	16	TBD	TBD	1	16	0	0	0	0	0	0
1916	57-0000-10275-010	LAWRENCE & SUSAN RICHARD LIVING TRUST ETAL	Cass	ND		10	1	9	TBD	TBD	1	9	0	0	0	0	0	0
1919	57-0000-10280-010	MINNKOTA POWER	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
1926	57-0000-10289-030	CASS COUNTY JOINT WATER RESOURCE DISTRICT	Cass	ND		3	1	2	TBD	TBD	1	2	0	0	0	0	0	0
1935	57-0000-10290-010	MINNKOTA POWER COOP INC	Cass	ND		3	0	3	TBD	TBD	0	3	0	0	0	0	0	0
1939	57-0000-10300-020	STEVEN & COLLEEN M BRAKKE	Cass	ND		18	1	17	TBD	TBD	1	17	0	0	0	0	0	0
1948	57-0000-10309-030	ANGELA R COSSETTE LE	Cass	ND		4	2	2	TBD	TBD	2	2	0	0	0	0	0	0
1953	57-0000-10314-000	GERALD D & GAIL J MOE	Cass	ND		4	1	3	TBD	TBD	1	3	0	0	0	0	0	0
1955	57-0000-10314-010	CASS COUNTY JOINT WATER RESOURCE DISTRICT	Cass	ND		2	1	1	TBD	TBD	1	1	0	0	0	0	0	0
1958	57-0000-10320-030	DANIEL TROTTIER	Cass	ND		3	1	2	TBD	TBD	0	2	1	0	0	0	0	0
1959	57-0000-10320-040	PETER A IHLE	Cass	ND		4	1	3	TBD	TBD	1	3	0	0	0	0	0	0
1960	57-0000-10320-050	GEORGE RICHARD	Cass	ND		3	0	3	TBD	TBD	0	3	0	0	0	0	0	0
1968	57-0000-10343-010	STUART D BOYER	Cass	ND		4	1	3	TBD	TBD	0	0	0	1	1	2	0	0
1972	57-0000-10349-000	ORTEN B & SANDRA A BRODSHAUG	Cass	ND		18	1	17	TBD	TBD	0	14	0	3	1	0	0	0
1990	57-0000-10360-020	CASS COUNTY JOINT WATER RESOURCE DISTRICT	Cass	ND		4	0	4	TBD	TBD	0	4	0	0	0	0	0	0
1992	57-0000-10361-020	CASS COUNTY JOINT WATER RESOURCE DISTRICT	Cass	ND		9	1	8	TBD	TBD	1	8	0	0	0	0	0	0
2002	57-0000-10369-010	GARY L & PATRICIA REDLIN	Cass	ND		9	1	8	TBD	TBD	1	8	0	0	0	0	0	0
2010	57-0000-10376-040	SCOTT & MARYJANE NIPSTAD	Cass	ND		2	1	1	TBD	TBD	0	0	0	1	1	0	0	0
2016	57-0000-10379-020	NIPSTAD FARMS INC	Cass	ND		33	1	32	TBD	TBD	0	3	0	9	1	20	0	0
2023	57-0000-10406-030	STEVEN M & CHRISTI C ARMBRUST	Cass	ND		4	1	3	TBD	TBD	0	0	0	0	1	3	0	0

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					Totals	1030	166	864	0	0	56	387	10	95	90	322	10	60
OID	Parcel_ID	Name	City/ County	State		Total Structures	Total Res.	Total Non-Res.	Category 1		Category 2		Category 3		Category 4		Category 5	
									Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.
2024	57-0000-10406-050	SCOTT & SARA BLETH	Cass	ND		6	1	5	TBD	TBD	0	0	0	0	1	5	0	0
2029	57-0000-10409-027	DELORES KLEINJAN	Cass	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
2033	57-0000-10413-000	SHERRY A COLEHOUR REVOCABLE LIVING TRUST ETAL	Cass	ND		8	1	7	TBD	TBD	0	4	0	3	1	0	0	0
2039	57-0000-10417-010	NANCY RAE & JUSTIN A JOHNSON	Cass	ND		4	1	3	TBD	TBD	0	0	1	2	0	1	0	0
2044	57-0000-10420-010	PAUL S & MARGARET R COSE	Cass	ND		6	1	5	TBD	TBD	0	0	0	0	1	5	0	0
2045	57-0000-10420-040	PAUL S & MARGARET R COSE	Cass	ND		3	0	3	TBD	TBD	0	0	0	0	0	3	0	0
2046	57-0000-10420-070	JOHN L & KATHLEEN J LUECKE LE	Cass	ND		1	0	1	TBD	TBD	0	0	0	1	0	0	0	0
2154	57-0350-00010-000	RYAN J & AMANDA K MCDOWELL	Cass	ND		24	1	23	TBD	TBD	0	0	0	0	0	0	1	23
2182	57-0750-00010-000	CASS COUNTY JOINT WATER RESOURCE DISTRICT	Cass	ND		1	1	0	TBD	TBD	1	0	0	0	0	0	0	0
2183	57-0800-00010-000	JOHN L & KATHLEEN J LUECKE LE	Cass	ND		4	1	3	TBD	TBD	0	0	1	1	0	2	0	0
2184	57-0800-00020-000	AARON & KATIE CARLSON	Cass	ND		1	1	0	TBD	TBD	0	0	1	0	0	0	0	0
2185	57-0000-10266-000	DUANE A & DONNA SIEBELS	Cass	ND		3	1	2	TBD	TBD	0	0	0	0	1	2	0	0
7002	57-0000-10218-040	BRENDAN & DANIEL CHRISTENSON	Cass	ND		1	0	1	TBD	TBD	0	0	0	1	0	0	0	0
7004	57-0000-10335-090	BRIAN & EMILY POTTER	Cass	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8385	64-0000-02793-020	ERIC J SCORE	Cass	ND		8	1	7	TBD	TBD	1	7	0	0	0	0	0	0
8386	64-0000-02951-000	LEO A & AMY M COSSETTE	Cass	ND		9	1	8	TBD	TBD	1	8	0	0	0	0	0	0
8920	57-0000-10280-030	MICHAEL T HANSON	Cass	ND		9	1	8	TBD	TBD	1	8	0	0	0	0	0	0
9163	57-0590-00010-000	LANCE FREIER	Cass	ND		2	1	1	TBD	TBD	0	0	1	1	0	0	0	0
9231	57-0000-10368-020	TYLER J RUPP	Cass	ND		2	0	2	TBD	TBD	0	0	0	0	0	2	0	0
9232	57-0000-10368-030	TYLER J RUPP	Cass	ND		6	1	5	TBD	TBD	0	0	0	0	1	5	0	0
9341	57-0000-10201-117	JODY A & KARLA J SLUSHER	Cass	ND		4	1	3	TBD	TBD	1	3	0	0	0	0	0	0
9347	57-0375-00010-000	VINCENT L ULSTAD	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
9382	57-0500-00020-000	JONATHAN D KRISTEN L KUTZER	Cass	ND		2	1	1	TBD	TBD	1	1	0	0	0	0	0	0
9383	57-0500-00030-000	JEREMY D HOLCK	Cass	ND		1	1	0	TBD	TBD	1	0	0	0	0	0	0	0
9387	57-0500-00070-000	BRAD E & LINDA M BERNHARDT	Cass	ND		1	1	0	TBD	TBD	1	0	0	0	0	0	0	0
9398	57-0000-10201-120	MONTE E & VIRGINIA L BACHMANN	Cass	ND		2	1	1	TBD	TBD	1	1	0	0	0	0	0	0
9401	57-0000-10206-010	MICHAEL D & CHERYL E POST	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
9404	57-0340-00040-000	JRD CAMPBELL FAMILY INVESTMENT LLP	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
9416	57-0000-10211-080	BRIAN M & KELLY L DUCHSCHERER	Cass	ND		2	1	1	TBD	TBD	1	1	0	0	0	0	0	0
9423	57-0600-00040-000	TED A & MARY M JOHNSON	Cass	ND		4	1	3	TBD	TBD	1	3	0	0	0	0	0	0
9431	57-0400-00220-000	COREY & SHERRI SMITH	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
9438	57-0400-00210-000	COREY & SHERRI SMITH	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
9462	57-0000-10213-000	JDC BABES ADDITION LLC	Cass	ND		1	1	0	TBD	TBD	1	0	0	0	0	0	0	0
9993	57-0000-10286-030	BJM LAND INC	Cass	ND		14	0	14	TBD	TBD	0	14	0	0	0	0	0	0
9994	57-0000-10287-020	ROBERT MITCHELL	Cass	ND		1	1	0	TBD	TBD	1	0	0	0	0	0	0	0
10001	57-0000-10323-020	PAUL & JANICE JOHNSON RENTALS LLC	Cass	ND		10	1	9	TBD	TBD	0	0	0	0	1	9	0	0
10002	57-0000-10258-020	SCOTT E & VICKI J TURNER	Cass	ND		10	1	9	TBD	TBD	0	0	0	0	1	9	0	0
10003	57-0000-10256-000	CINDY L NORBERG	Cass	ND		7	1	6	TBD	TBD	0	2	0	4	1	0	0	0
10004	57-0000-10252-031	CARL J FELIX	Cass	ND		2	0	2	TBD	TBD	0	0	0	2	0	0	0	0
10007	64-0000-02800-040	TERRY M & KRISTIE M SAUVAGEAU	Cass	ND		2	1	1	TBD	TBD	1	1	0	0	0	0	0	0
10008	64-0000-02800-030	TERRY M & KRISTIE M SAUVAGEAU	Cass	ND		9	0	9	TBD	TBD	0	9	0	0	0	0	0	0
10011	64-0000-02956-000	JOHN & CYNTHIA VARRIANO	Cass	ND		1	1	0	TBD	TBD	1	0	0	0	0	0	0	0
10012	64-0000-02957-000	JONATHAN DEAN & TARA L BULTEMA	Cass	ND		2	1	1	TBD	TBD	1	1	0	0	0	0	0	0
10013	64-0000-02954-000	CODY D SKYTLAND ETAL	Cass	ND		2	1	1	TBD	TBD	1	1	0	0	0	0	0	0
10014	64-0000-02953-000	GORDON & ELIZABETH BAKER	Cass	ND		4	1	3	TBD	TBD	1	3	0	0	0	0	0	0
10015	64-0000-02952-000	GREGORY J & MARY D BEYER	Cass	ND		2	1	1	TBD	TBD	1	1	0	0	0	0	0	0

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OID	Parcel_ID	Name	City/ County	State		Total Structures	Total Res.	Total Non-Res.	Category 1		Category 2		Category 3		Category 4		Category 5	
									Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.
10016	64-0000-02955-000	JOSEPH W MERZ	Cass	ND		3	1	2	TBD	TBD	1	2	0	0	0	0	0	0
10017	64-0000-02933-000	STEVEN D SCHULTZ	Cass	ND		10	0	10	TBD	TBD	0	10	0	0	0	0	0	0
10018	01-3511-00360-000	CONTRACTORS LEASING	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
10019	64-0000-02760-000	LEONIE RHEAULT	Cass	ND		7	1	6	TBD	TBD	1	6	0	0	0	0	0	0
10020	64-0000-02751-020	PAULETTE Y RHEAULT LE	Cass	ND		3	1	2	TBD	TBD	1	2	0	0	0	0	0	0
10021	64-0000-02751-010	WALTER E RASMUSSEN ETAL	Cass	ND		9	1	8	TBD	TBD	1	8	0	0	0	0	0	0
10022	64-0000-02786-000	GENE J & BRENDA J SAUVAGEAU	Cass	ND		4	1	3	TBD	TBD	1	3	0	0	0	0	0	0
10023	01-3511-00350-000	KELLY ROSEEN	Cass	ND		7	1	6	TBD	TBD	1	6	0	0	0	0	0	0
10024	64-0000-02710-040	RYAN C & JESSICA L RICHARD	Cass	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
10025	64-0000-02710-030	RICHARD FARM ENTERPRISES LP	Cass	ND		18	1	17	TBD	TBD	1	17	0	0	0	0	0	0
1556	49-1410-05022.000	RAEDER, ALDA G	Christine	ND		5	0	5	TBD	TBD	0	0	0	0	0	5	0	0
1566	49-0001-05003.000	CHRISTINE, CITY OF	Christine	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
1567	49-0001-05001.000	CHRISTINE, CITY OF	Christine	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
8683	49-1405-05008.001	MJONESS, JOSHUA J & JENNIFER M	Christine	ND		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
8687	49-0001-04849.000	HEMPEL, PAUL & LAURIE	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8688	49-0001-04846.000	MOREL, MARLO G	Christine	ND		2	1	1	TBD	TBD	0	0	0	1	1	0	0	0
8689	49-0001-04852.000	DES ROCHES, MICHAEL A	Christine	ND		3	1	2	TBD	TBD	0	0	0	0	1	2	0	0
8690	49-0001-04843.000	DES ROCHES, JAMES A&THERESA JO	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8691	49-0001-04842.000	RAEDER, ALDA G	Christine	ND		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
8692	49-0001-04840.000	LANEY, CARSON	Christine	ND		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
8693	49-0001-05004.000	RAEDER, ALDA G	Christine	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
8694	49-0001-05004.010	LANEY, CARSON	Christine	ND		2	0	2	TBD	TBD	0	0	0	0	0	2	0	0
8695	49-1410-05030.000	HILDEBRANT, JEANINE	Christine	ND		2	1	1	TBD	TBD	0	1	0	0	1	0	0	0
8696	49-1410-05030.100	NOREEN, JOEL C & CRYSTAL A	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8700	49-0001-04978.000	THORSELL, LEON P & DOROTHY A	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8701	49-0001-04977.000	THORSELL, LEON P & DOROTHY A	Christine	ND		2	0	2	TBD	TBD	0	0	0	0	0	2	0	0
8703	49-0001-04974.000	KIRSCH, JAMES D	Christine	ND		5	1	4	TBD	TBD	0	0	0	0	1	4	0	0
8708	49-0001-04888.000	MONSON, RANDY HOWARD	Christine	ND		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
8709	49-0500-05032.030	MONSON, RANDY HOWARD	Christine	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
8713	49-0001-04991.000	SCHWAN, JANE L	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8714	49-0001-04992.000	ALBRECHT, DAVID E	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8715	49-0001-04993.000	JAMES, TOSHIKO ETAL	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8716	49-0001-04994.000	BRANDT, WARREN	Christine	ND		4	1	3	TBD	TBD	0	0	0	1	1	2	0	0
8717	49-0001-04996.000	WIRT, SPENCER &	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8718	49-1410-05026.000	WALLEVAND, JOSEPH H & LINDA	Christine	ND		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
8719	49-1410-05025.000	TRITTIN, BEVERLY R &	Christine	ND		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
8720	49-1410-05028.000	KRAMLICH, DELORES GRACE	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8722	49-1410-05027.000	STEBLETON, KEITH	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8724	49-1410-05029.200	ERICKSON, MARK &	Christine	ND		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
8726	49-1410-05029.000	ERICKSON, MARK &	Christine	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
8727	49-1410-05029.300	BRANDNER, DONALD W & JANICE M	Christine	ND		3	1	2	TBD	TBD	0	0	0	0	1	2	0	0
176	01-0000-00003.100	HIGH PLAINS PROPERTIES LLC	Richland	ND		4	1	3	TBD	TBD	0	0	0	0	1	3	0	0
1327	01-0000-00092.100	BERNHARDT, JEFFREY L	Richland	ND		11	1	10	TBD	TBD	0	0	0	0	1	10	0	0
1328	01-0000-00014.100	RUFER, MICHAEL F & DARLA L	Richland	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
1329	01-0000-00017.101	GRANHOLT, JOSHUA C & SUZANNE	Richland	ND		4	1	3	TBD	TBD	0	0	0	0	1	3	0	0
1330	01-0000-00030.300	ANDERSON, PATRICK R &	Richland	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0

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12-Mar-2018

Additional analysis is needed to determine the CLOMR Floodway. The structures in Category 1 are currently included in other categories.

					Totals	1030	166	864	0	0	56	387	10	95	90	322	10	60
OID	Parcel_ID	Name	City/ County	State		Total Structures	Total Res.	Total Non-Res.	Category 1		Category 2		Category 3		Category 4		Category 5	
									Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.
1335	01-0000-00018.001	NELSON, CURTIS H & ELLEN D	Richland	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
1336	01-0000-00019.000	GRANHOLT, CRIAG & LAVONNE	Richland	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
1345	01-0000-00014.200	RUFER, MICHAEL F & DARLA L	Richland	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
1348	01-0000-00028.100	GRANHOLT, CRAIG E & LAVONNE R	Richland	ND		3	1	2	TBD	TBD	0	0	0	0	1	2	0	0
1349	01-0000-00032.000	KINNEBERG, JOSHUA J	Richland	ND		6	1	5	TBD	TBD	0	1	0	0	1	4	0	0
1356	01-0000-00028.000	GRANHOLT, CRAIG E & LAVONNE R	Richland	ND		13	1	12	TBD	TBD	0	1	0	1	1	10	0	0
1367	01-0000-00097.101	RAEDER, RANDY D & DONNA J	Richland	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
1375	01-0000-00124.000	ISRAELSON LAND PRTSHP LLLP	Richland	ND		8	1	7	TBD	TBD	0	0	0	0	1	7	0	0
1402	01-0000-00081.075	PATRICK, DENNIS E & WANDA I	Richland	ND		4	1	3	TBD	TBD	0	0	0	0	1	3	0	0
1405	01-0000-00001.130	ANDERSON, LORI J	Richland	ND		2	0	2	TBD	TBD	0	2	0	0	0	0	0	0
1411	01-0000-00068.100	HEESCH, RONALD G & MELISSA A	Richland	ND		6	1	5	TBD	TBD	0	0	0	0	1	5	0	0
1412	01-0000-00072.000	KOPP, ALAN P & JUNE L	Richland	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
1473	01-0000-00079.000	MATHISON, LOIS M	Richland	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
1478	01-0000-00081.155	PATRICK, CHAD E	Richland	ND		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
1485	01-0000-00074.000	KOPP, ALAN P & JUNE L	Richland	ND		3	1	2	TBD	TBD	0	0	0	1	1	1	0	0
1515	01-0000-00118.000	KLEIN, PAUL &	Richland	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
1517	01-0000-00121.000	FALK, JAMES P & KAREN J	Richland	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
1541	02-0000-00324.200	TOMMERAUS, DUWAYNE & PEGGY	Richland	ND		9	1	8	TBD	TBD	0	0	0	0	1	8	0	0
1542	01-0100-00004.010	NELSON, GARY H	Richland	ND		3	1	2	TBD	TBD	0	0	0	0	1	2	0	0
1543	01-0000-00004.210	KNUDSEN, KENNETH C & MELANIE M	Richland	ND		2	1	1	TBD	TBD	0	0	0	0	1	1	0	0
1544	01-0100-00004.000	NELSON, GARY H	Richland	ND		1	0	1	TBD	TBD	0	0	0	1	0	0	0	0
1545	01-0000-00016.000	JOHNSON, MICHELE K	Richland	ND		6	2	4	TBD	TBD	0	0	0	0	2	4	0	0
1548	01-0000-00008.000	SWENSON, ALLAN P & MARY H M	Richland	ND		6	1	5	TBD	TBD	0	0	0	2	1	3	0	0
1550	02-0000-00322.000	BERGH, KENNETH D & LOIS M	Richland	ND		7	1	6	TBD	TBD	0	0	0	0	1	6	0	0
1551	02-0000-00329.000	ROGNE, P. TRANA	Richland	ND		7	1	6	TBD	TBD	0	0	0	0	1	6	0	0
1569	01-0000-00113.000	MILLER, JON E LTD FAMILY PRT	Richland	ND		2	0	2	TBD	TBD	0	0	0	0	0	2	0	0
1583	01-0000-00094.000	THORESON, JAMES C & CAROLINE P	Richland	ND		5	1	4	TBD	TBD	0	0	0	1	1	3	0	0
1597	01-0000-00030.100	MARSCHNER, BRANDON	Richland	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
1598	01-0000-00030.250	EAGLE VALLEY EVANGELICAL	Richland	ND		2	0	2	TBD	TBD	0	0	0	0	0	2	0	0
1600	01-0000-00004.201	KNUDSEN, KENNETH C & MELANIE M	Richland	ND		11	0	11	TBD	TBD	0	1	0	0	0	10	0	0
1604	01-0000-00001.180	ANDERSON, LORI J	Richland	ND		1	0	1	TBD	TBD	0	1	0	0	0	0	0	0
8579	01-0000-00169.000	BEAUDIN, PAULINE C	Richland	ND		1	0	1	TBD	TBD	0	0	0	0	0	0	0	1
8728	01-0000-00121.100	RUTTEN, ROBERT & SALLY	Richland	ND		3	1	2	TBD	TBD	0	0	1	1	0	1	0	0
8729	01-0000-00114.000	DUFNER, TERRY J & DONNA C	Richland	ND		5	2	3	TBD	TBD	0	1	0	0	2	2	0	0
8763	02-0000-00321.000	TOPPEN, TODD & LEANN	Richland	ND		15	2	13	TBD	TBD	0	0	0	0	0	0	2	13
8765	02-0000-00314.000	MILLER, TIMOTHY J & STACEY M	Richland	ND		3	1	2	TBD	TBD	0	0	0	0	0	0	1	2
8775	01-0000-00130.100	HOHERTZ, JAMES B & LINDA G	Richland	ND		6	1	5	TBD	TBD	0	0	0	0	1	5	0	0
9235	01-0000-00077.100	SPETEN, KENNETH J & KAREN	Richland	ND		5	1	4	TBD	TBD	0	0	0	0	1	4	0	0
9237	01-0200-00077.110	AMBUEHL, CHARLES D	Richland	ND		1	1	0	TBD	TBD	0	0	0	0	1	0	0	0
9251	01-0000-00001.210	ANDERSON, LORI J	Richland	ND		1	0	1	TBD	TBD	0	0	0	0	0	1	0	0
9253	01-0000-00001.190	ANDERSON, LORI J	Richland	ND		1	1	0	TBD	TBD	0	0	1	0	0	0	0	0
9258	01-0000-00088.100	CIRKS, PENNY	Richland	ND		4	1	3	TBD	TBD	0	2	0	0	1	1	0	0

Rustad
16
21
16
36
17S
Cass County
Clay County
36
Oxbow
25
Comstock
18
46
29
29
81
Wilkin County
26
Christine
2
Wolverton
75
1
Richland
County
Walcott
2
180

Legend

- Alignment Centerline (Plan B)
- Levee
- Flowage Easement Area
- Revision Reach Area
- Takings Analysis Area
- Plan B 100-Year Inundation

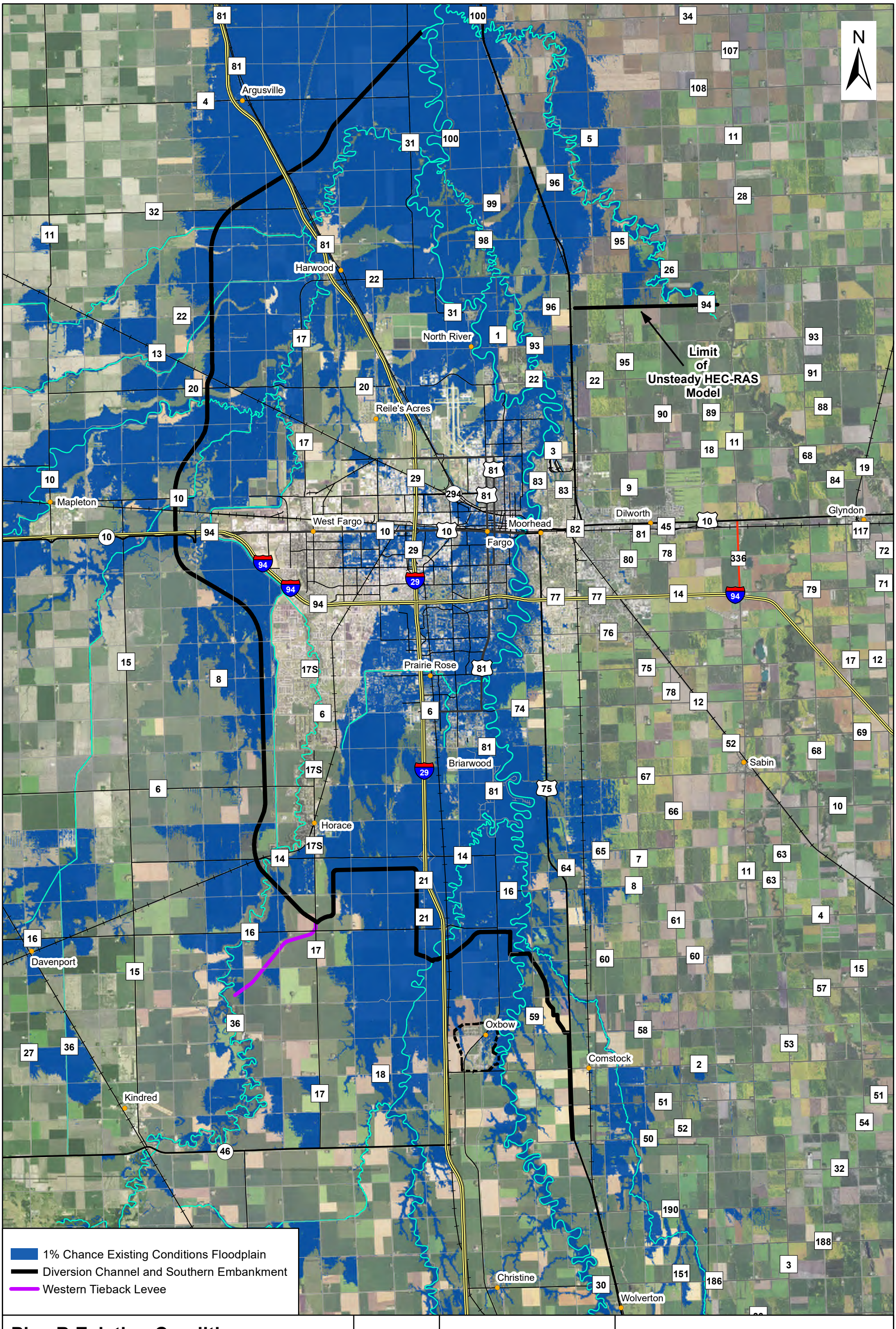
FM AREA DIVERSION PROJECT
UPSTREAM MITIGATION AREA

N
W
E
S

0 0.6 1.2 2.4 Miles

FM AREA DIVERSION PROJECT

Created By: KMV Date Created: 02/28/18 Date Saved: 03/15/18 Date Exported: 03/15/18
Plotted By: kyle.volk Parcel Date: Varies Aerial Image: N/A Elevation Data: 2008 Lidar
Horizontal Datum: NAD 1983 StatePlane North Dakota South FIPS 3302 Feet Vertical Datum: NAVD1988
T:\Projects\17700\17738\ACWP\Inundation_Parcel_Review_Plan_B_2018_03_15.mxd



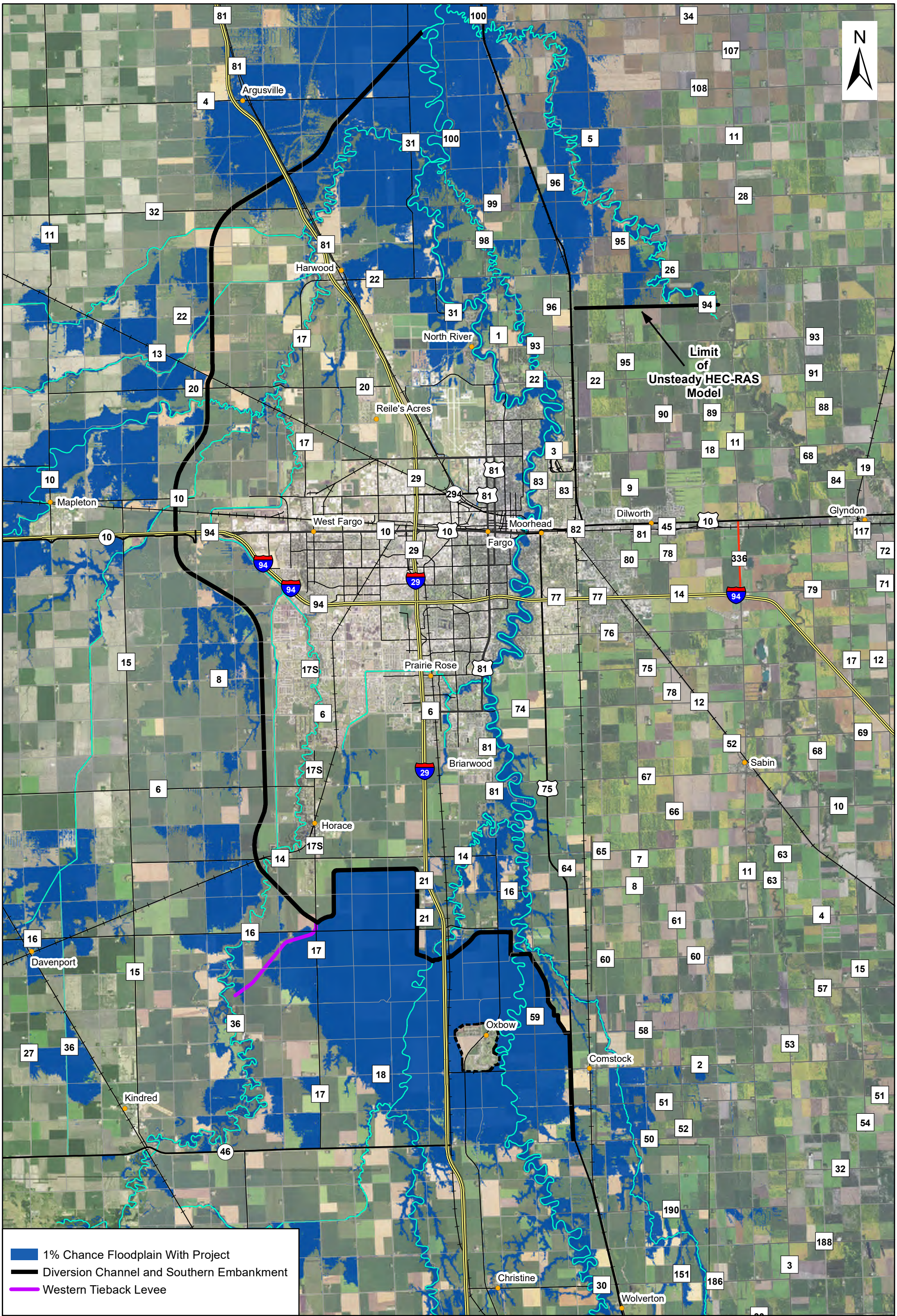
Plan B Existing Conditions
100 Year Floodplain

Created By: enelson Date Created: 3/8/2018 Date Exported: 3/8/2018 Image: 2015 County NAIP Elevation Data: -
Horizontal Datum: NAD 1983 UTM Zone 14N Vertical Datum: North American 1983
H:\Fargo\JBN\7400\7438\13_7438_015\Minnesota Dam Safety Permit\GIS\7A10DMapping_OverallPolygons.mxd

N W E S

0 0.75 1.5 3
Miles

HMG



Plan B With Project
100 Year Floodplain

Created By: enelson Date Created: 3/8/2018 Date Exported: 3/8/2018 Image: 2015 County NAIP Elevation Data: -
Horizontal Datum: NAD 1983 UTM Zone 14N Vertical Datum: North American 1983
H:\Fargo\JBN\7400\7438\13_7438_015\Minnesota Dam Safety Permit\GIS\7A10DMapping_OverallPolygons.mxd

N W E S

0 0.75 1.5 3
Miles

HMG

FEMA/USACE Coordination Plan

Project: **Fargo-Moorhead Metropolitan Feasibility Study**

ND Diversion Channel with upstream staging – Federal Plan (Authorized WRRDA 2014)

Project Design: **U.S. Army Corps of Engineers, St. Paul District**

Project Reach: **Diversion begins along the Red River of the North approximately 4 miles south of the confluences of the Red and Wild Rice Rivers and eventually re-enters the Red River north of the confluence of the Red and Sheyenne Rivers near the city of Georgetown, MN. Along the 36 mile path, it would cross the Wild Rice, Sheyenne, Maple, Lower Rush and Rush Rivers.**

Floodplain Management Requirements – 44 CFR Sections 60.3, 65.3, 65.6, 65.8, and 65.12:

Section 60.3, Floodplain Management Criteria – requires that communities:

- Notify adjacent communities and the state coordinating office prior to any alterations and submit copies to the Associate Administrator, Federal Insurance and Mitigation Administration (FIMA),
- Ensure the flood carrying capacity is maintained within any altered or relocated watercourse,
- Prohibit encroachments in the Special Flood Hazard Areas (SFHAs), the area subject to inundation during the base (1-percent-annual-chance) flood, with no mapped floodways that will cause increases in the base flood elevations (BFEs) of more than the allowable surcharge (1.0 in North Dakota and 0.5 in Minnesota),
- Prohibit encroachments in mapped floodways which would result in any increase in BFEs, and
- Notwithstanding any other provisions, if encroachments are allowed and will cause a rise in BFEs exceeding these limits, submit a Conditional Letter of Map Revision (CLOMR) for FEMA comment.

Section 63.5, Requirement to Submit New Technical Data – requires that communities submit new data when base flood elevations increase or decrease from physical changes that affect flooding conditions. This information must be submitted no later than 6 months after it becomes available.

Section 65.6, Revision of Base Flood Elevation Determinations – identifies data that communities must submit, under the map revision process, to support a request to revise the FIS report and FIRM including, but not necessarily limited to:

- new or revised hydrologic analysis,
- new or revised hydraulic analyses,
- new or revised delineation of floodplain boundaries, and
- new or revised floodways.

Section 65.8, Review of Proposed Projects – requests by communities for FEMA to provide:

- Written comments on proposed projects in the form of a Conditional Letter of Map Revision (CLOMR), and
- Comments on whether the proposed project will justify a revision to the FIRM, if the project is built as proposed.

Data required to support such requests are similar to data discussed above for a map revision.

Section 65.12, Revisions to Reflect BFEs Caused by Encroachments – requires that communities apply to FEMA for conditional approval (see 44 CFR Part 72 of the NFIP regulations) of actions which will cause increases in BFEs in excess of the limits discussed above prior to permitting the encroachments to occur, and must:

- complete a request using the MT-2 application forms,
- provide an evaluation of alternatives,
- document individual legal notice to impacted property owners,
- obtain concurrence of CEOs of communities impacted by the proposed actions, and
- provide a certification that no structures are impacted by increased BFEs or a description of the proposed mitigation measures for all impacted structures, within the Revision Reach as defined below.

FEMA Flood Insurance Study (FIS) Reports and Flood Insurance Rate Maps (FIRM):

Effective FIS Reports and FIRMs - The Cass County, ND partial countywide FIS Report and FIRMs went effective on January 16, 2015. Effective FIS Reports and FIRMs for all communities impacted by the proposed project are available at the FEMA Map Service Center site at: http://www.msc.fema.gov/.

Preliminary FIS Report and FIRMs – Preliminary FIS Reports and FIRMs have been issued for Wilkin County, MN. Local project sponsors have access to the FIS and FIRMs effective and issued preliminary for their jurisdictions.

Red River of the North Modeling:

Effective FIRM Models – The Eastern Cass Partial Countywide study went effective on January 16, 2015. The hydraulic analysis for the revised portion of the Red River of the North (South of 29th Street Southeast) was developed by Houston Engineering, Inc., and was finalized in February 2009. This analysis uses the USACE HEC-RAS steady flow model. Hydraulic analysis for the unrevised portion of the Red River of the North (North of 29th Street Southeast) was completed by the USACE in 1985. This analysis uses the USACE HEC-2 computer program.

Preliminary FIRM Models – Preliminary FIS Reports and FIRMs have been issued for Wilkin County, MN. The hydraulic analyses for the Red River of the North from the Clay County boundary to approximately 90 feet downstream from State Highway 210 were performed by USACE, St. Paul District and FEMA. The work was completed in January 2003. The models used for the preliminary FIS Report and FIRMs along the Red River of the North utilize the USACE HEC-RAS steady flow models.

USACE Fargo-Moorhead Metropolitan Feasibility Study Models – The HEC-RAS models used for this study along the Red River of the North were developed by the USACE by converting the 2003 steady flow models to unsteady flow models and also included updating overbank data with LiDAR information, updating channel bathymetry with recent surveys, and adding many storage areas and connections. The models prepared by USACE included:

- **Existing or Pre-Project Conditions Model (ECM) –** The USACE's updated HEC-RAS unsteady flow model which incorporates the updated floodplain and channel information will be used as the pre-project conditions model.
- **Revised or Post-Project Conditions (RCM) Model –** The USACE's updated HEC-RAS unsteady flow model for existing conditions was updated to include the effects of the proposed Fargo-Moorhead Metropolitan Feasibility Study project, and represents the post-project conditions model.

These models were based on the hydrology analysis for the wet period of record (1942-2009), which provides a peak discharge of 34,700 cubic feet per second (cfs), compared to the 29,300 cfs peak discharge used in the effective models for the 1-percent-chance-annual flood. FEMA has reviewed the hydrology for both the wet period 1-percent-chance-annual flood peak discharge of 34,700 cfs and the period of record (through 2009) peak discharge (33,000 cfs) and found that either discharge would be reasonable for FEMA mapping.

Impacts on Other Streams

The other major streams potentially impacted by this project are:

- Wild Rice River
- Sheyenne River
- Maple River
- Lower Branch of the Rush River
- Rush River
- other minor streams shown on effected FIRMs along the proposed diversion route

Information Required for CLOMR Application:

The following information would be needed for the submission of the CLOMR application:

- **MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision including:**
  - **Form 1 - Overview & Concurrence Form** provides the basic information regarding the revision request and requires the signatures of the requester, community official(s), and engineer,
  - **Form 2 -Riverine Hydrology & Hydraulics Form** provides the basic information on the scope and methodology of hydrologic and/or hydraulic analyses that are prepared in support of the revision request,
  - **Form 3 -Riverine Structures Form** provides the basic information regarding hydraulic structures constructed in the stream channel or floodplain. This form should be used for revision requests that involve new or proposed channelization, bridges/culverts, dams/basins, and/or levees/floodwalls,
  - **Payment Information Form** -Provides the basic information regarding any fees paid for a CLOMR, if required (note: federally sponsored flood-control-projects where 50 percent or more of the project's costs are federally funded are exempt from fees), and
  - **ESA Compliance Documentation –** must be submitted for CLOMRs only. Appropriate documentation includes a copy of an Incidental Take Permit, an Incidental Take Statement, a "not likely to adversely affect" determination from NMFS or USFWS, or an official letter from NMFS or USFWS concurring that the project has "No Effect" on proposed or listed species or designated critical habitat.

- **Additional supporting information which would accompany the forms listed above includes:**

    - **Revision Reach -** The extent of the revision is defined by an effective tie-in at the upstream and downstream limits for each flooding source. An effective tie-in is obtained when the revised base flood elevations from the *post-project* conditions model are within 0.5 feet of the *pre-project* conditions model at both the upstream and downstream limits. The downstream end of the revision reach is at the outlet of the diversion channel, and the upstream end of the reach will be near model station 2650000 as shown in the attached map. The upstream end of the reach on the Red River is approximately 2 miles east and 0.75 miles north of Christine, ND. Christine, ND is within the revision area. The upstream end of the reach on the Wild Rice River coincides with the northern boundary of Richland County, ND.

    - **Staging Area Regulatory Mapping -** The areal extent of flood inundation required by the Project for operation in the Staging Area will be mapped as floodway in order to ensure that the required storage volume is available for the project during the 1-percent-annual-chance event. Any additional flood inundation area beyond the extents of what is required by the project during the 1-percent-annual-chance event will be mapped as floodplain in order to portray the elevated flood risk outside of the required staging area.

    - **Mitigation of Project Impacts -** The extent of mitigation of impacts caused by the Project is also defined by the revision reach. The impacts within the designated project Staging Area will be mitigated in accordance with the Project's Feasibility Study/EIS (FEIS) dated July 2011, and authorized for construction in WRRDA 2014. Impacts caused by the Project to structures located within the revision reach that are not identified for mitigation in the FEIS will generally follow the same mitigation strategy as identified in the FEIS. The impacts caused by the Project on all insurable structures within the revision reach will be mitigated through agreed methods consistent with those specified by the National Flood Insurance Program (NFIP). For residential structures, these include elevation, relocation, buy-outs, and ring levees. For non-residential structures, these include dry flood proofing, elevation, relocation, buy-outs, and ring levees. The CLOMR will include a general plan as to how structures will be mitigated. A site-by-site analysis will not be necessary for the CLOMR.

- **Models accompanying Form 2 including:**

  - **Corrected Effective Model (CEM) –** The USACE 2003 steady flow HEC-RAS model is utilized to best represent the current effective and preliminary modeling on the Red River of the North. It uses the current effective peak discharge for the 1-percent-chance-annual flood (29,300 cfs). Therefore, this model will be the base condition model used for comparison purposes in the CLOMR submittal.

  - **Existing or Pre-Project Conditions Model (ECM) –** The USACE's updated HEC-RAS unsteady flow model which incorporates the updated floodplain and channel information will be used as the pre-project conditions model.

  - **Revised or Post-Project Conditions (RCM) Model –** The USACE's updated HEC-RAS unsteady flow model for existing conditions was updated to include the effects of the proposed Fargo-Moorhead Metropolitan Feasibility Study project, and represents the post-project conditions model.

- **Public Notices and Property Owner Notifications -** The primary purpose for notifications, whether they are public notices or property owner notifications, is to make certain that all affected parties (property owners and communities) are aware of any proposed changes to the map prior to those changes being permitted and shown on a revised FIRM.

  - **For Section 65.12 Revisions Based on Proposed Encroachments -** This requirement is met by providing individual legal notice to all impacted property owners explaining the impact of the proposed map revision on their property. The community must notify property owners of the impact to their property prior to the community issuing building and/or construction permits for the proposed project.

  - **For Section 65.6 Revisions of Base Flood Elevations –** Anytime BFEs are being revised (whether increasing or decreasing) or being established along a flooding source, notification of these BFEs must be published in the community's local newspaper twice within a 10-day period. FEMA publishes this notification, on behalf of the affected community(s). The

2nd publication date of this notice initiates the 90-day appeal process for the map revision. The notification is required during the actual map revision process.

- **Comparison of Models –** A comparison of the models should be made to address the impacts of the project on the corrected effective, existing or pre-project, and revised or post-project conditions BFEs, and SFHA and floodway boundaries. Discharge differences between the various models based on updated or revised hydrology conditions should also be discussed and evaluated.

- **Suggested Model Comparisons:**

  - Comparisons of the CEM BFEs to the BFEs for the current effective FIS profiles (which are both based on the same peak 1-percent-annual-chance discharges) discussing the differences in the BFEs.

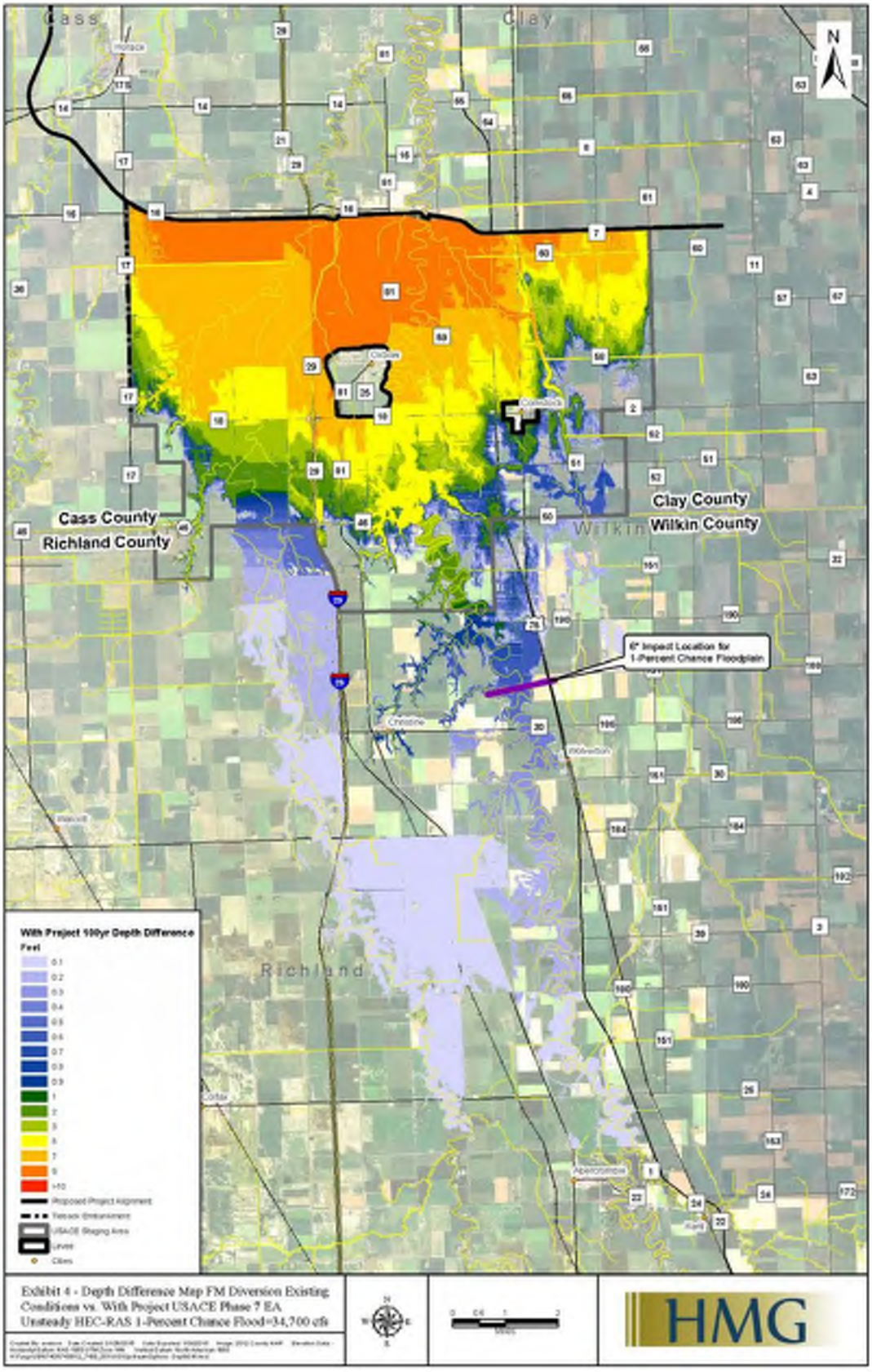
  - The ECM to the CEM. For this comparison, since the ECM model uses HEC-RAS unsteady flow with updated hydrologic data and the CEM model uses HEC-RAS steady flow, the 1-percent-annual-chance peak discharges are not similar and cannot be compared directly. Therefore, the comparisons would be best estimated by comparing the ECM model elevations for the 2-percent-annual-chance flood (peak discharge comparable to the CEM 1-percent-chance-annual discharge) to the CEM 1-percent-annual-chance elevations. Discuss and explain the differences related to hydrologic and hydraulic conditions in the models.

  - The RCM to the ECM, which represents the comparison of the post-project conditions to the pre-project conditions. For this comparison, discuss the differences in BFEs and boundaries of the SFHAs and floodways. In addition to the Red River of the North, comparisons for all other flooding sources shown on the effective FIRMs, where applicable, will be necessary.

  - The RCM to CEM, which represents the comparison of the post-project conditions to the base conditions model and identifies the area impacted by this revision request.

Information Required for Map Revision Application:

It is anticipated that a request for a map revision will be submitted upon completion the project. The ECM and the RCM will be updated to reflect post-project conditions and used in the submittal for the map revision for the project. Information will need to follow the requirements of 44 CFR Part Section 65.6 and the MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision. Remapping will be initiated upon request by the local communities, following project completion.


Cass
Clay
N
Cass County
Richland County
Clay County
Wilkin County
6" Impact Location for
1-Percent Chance Floodplain
Richland
With Project 100yr Depth Difference
Feet
Exhibit 4 - Depth Difference Map FM Diversion Existing
Conditions vs. With Project USACE Phase 7 EA
Unsteady HEC-RAS 1-Percent Chance Flood=34,700 cfs
HMG

Flowage Easement Plan

Why is a Flowage Easement needed?

- The FM Area Diversion Project (Project) includes temporary retention of floodwaters upstream of the Project. The upstream retention is a necessary component of the Project, and it will periodically and temporarily store flood waters.
- The Diversion Authority must obtain flowage easements to provide the legal right to inundate properties impacted by the upstream mitigation area.
- There are various federal and state agencies that dictate the areas upon which flowage easements will be necessary. For example, the North Dakota State Water Commission has indicated that the Diversion Authority will need to obtain land rights (presumably a flowage easement) for all lands that are below the top of spillway elevation of the southern embankment structures. This area is approximately 40,000 acres.
- A floodway and a floodplain will be defined within the upstream mitigation area in accordance with FEMA standards. The exact size of the floodway outline is undetermined at this time, but it is estimated that the floodway will cover approximately 25,000 acres that are required for operation of the Project. No development will be allowed within the floodway. Development in the floodplain may be allowed in accordance with local floodplain development ordinances, rules, regulations, and the terms and conditions of the flowage easement.

What is a Flowage Easement?

- The easement provides the legal right to temporarily inundate property as part of the operation of the Project.
- USACE policy defines the compensation for a flowage easement as a one-time payment made at the time that the easement is acquired.
- The flowage easement will compensate for all impacts caused by the Project, such as potential loss of development rights, agricultural production impacts, and periodic and temporary flooding impacts (debris).
- Flowage easements will allow for farming to continue on properties, however development will be limited.

How will the value of the Flowage Easement be determined?

- Factors that will be considered include the depth, duration, and frequency of additional flooding; and the highest and best use of the property.
- It is expected that an appraiser will conduct a “before and after” valuation in which the market value of the property before the flowage easement are determined, and the market value after the flowage easement conditions are determined. The market value of the flowage easement will be a determined using the difference of before and after valuations.
- The appraiser of the property may consider future impacts including delayed planting, yield loss, debris, and limitations to future land use, resulting from operation of the Project.

- Values of flowage easements will vary depending on the location and type of the property, magnitude of impacts, and future risks to the property.
- The flowage easement payment is expected to be a one-time payment to the property owner. The payment will be made when the easement is acquired.
- The valuations will be compliant with USPAP and applicable state and federal guidelines

What are the terms and conditions of the Flowage Easement?

- The easement will describe the "Easement Property" upon which the easement applies.
- The easement will provide the right to occasionally overflow, flood and submerge the Easement Property in connection with the operation, maintenance, repair, replacement and rehabilitation of the Project.
- The easement will consider the development potential of the Easement Property in compliance with FEMA and local floodplain development rules.
- The easement will provide access rights related to the Project for conducting observations, surveys, reviews, and data collection for environmental assessments; conducting topographic field and parcel surveys, soil analysis, soil borings, and other investigations; conducting water level, erosion, water quality, habitat, environmental, and other relevant monitoring; performing any other testing, surveys, and analysis; and necessary and reasonable rights of ingress and egress to and from an "Access Area" of the Easement Property. The easement will authorize payment for crop damages caused by the exercise of the above described access rights.
- The easement will require removal of all structures in the floodway, and insurable structures not allowed in the floodplain, without them meeting floodplain management rules.
- The easement will define acceptable use of the property by Grantor (property owner) and Grantee (Diversion Authority).
- The easement will allow property owners to mortgage the property as long as the mortgage is subordinate to the flowage easement.
- The easement will also contain other legal terms including governing law, severability, etc.

When will the Flowage Easements be obtained?

- Flowage easements need to be acquired prior to operation of the Project. The current schedule and estimate indicates that flowage easements will need to be acquired by 2025.
- It is anticipated that several years will be required to acquire all of the flowage easements necessary for the Project.
- The Diversion Authority may start early in approaching property owners in the staging area with flowage easement needs.

Who will obtain the Flowage Easements?

- The Diversion Authority has assigned the property acquisition role in North Dakota to the CCJWRD.
- The Diversion Authority will assign the property acquisition role in Minnesota to the MCCJPA entity that is expected to be formed in 2018.

Sample Flowage Easement

FLOWAGE EASEMENT

THIS EASEMENT is made this ____ day of _____, 201X, by **[Insert Name(s)]**, **[Insert Marital Status]**, whose post office address is **[Insert Address]** ("Grantor"); and the [**Insert Acquiring Entity Name** , a [pick one: Minnesota / North Dakota] political subdivision, whose post office address is [**Insert Address**], and its successors and assigns ("Grantee").

RECITALS

A. The Grantee is a member of the METRO FLOOD DIVERSION BOARD OF AUTHORITY, a joint powers entity consisting of Clay County, Minnesota; City of Moorhead, Minnesota; Cass County, North Dakota; City of Fargo, North Dakota; and the Cass County Joint Water Resource District (the "Diversion Authority").

B. The Fargo-Moorhead Metro Flood Risk Management Project is a flood risk management project, sponsored by the United States Army Corps of Engineers (the "Corps") and the Diversion Authority, which includes a diversion channel and appurtenant staging and storage areas to reduce flood damages and risks in the region; the parties refer to the project as the FARGO-MOORHEAD METROPOLITAN AREA FLOOD RISK MANAGEMENT PROJECT, which is a federally authorized project pursuant to Section 7002(2) of the Water Resources Reform and Development Act of 2014 (the "Project").

C. Grantor owns certain real property in the vicinity of the Project, more specifically described below, in an area that may be subject to temporary and periodic flooding as a result of the Project.

D. Grantor has agreed to convey to Grantee a permanent easement, as more specifically described below, to permit Grantee to periodically flood portions of Grantor's property as well as granting certain access, survey, and exploration rights to Grantee.

E. Grantor agrees to grant and convey to Grantee an easement over the property described below, subject to the terms and conditions contained in this Easement.

In consideration of $XXX.XX, the mutual covenants contained in this Agreement, and other good and valuable consideration, the receipt and sufficiency of which the parties acknowledge, the parties agree as follows:

AGREEMENT

1. **The Easement Property**. Grantor grants and conveys to Grantee a permanent easement in, on, over, through, and across the following real property in [**Insert County and State**]:

[Insert Description]

The above described tract contains _____ acres, more or less.

(Collectively, the "Easement Property.")

A. Under this Easement, Grantor grants to Grantee, its officers, employees, agents, representatives, contractors, and subcontractors the following perpetual right, power, privilege and easement occasionally to overflow, flood and submerge the Easement Property in connection with the operation, maintenance, repair, replacement and rehabilitation of the Project as authorized by Section 7002(2) of the Water Resources Reform and Development Act of 2014, approved June 10, 2014, together with all right, title and interest in and to the structures and improvements now situated on the Easement Property, excepting fencing, and excepting any existing structures outside the Federal Emergency Management Agency (FEMA) floodway (based on the conditional letter of map revision (CLOMR)) that are in compliance, or Grantor may improve to be in compliance with floodplain development ordinances enforced by the local government agency and in compliance with FEMA floodplain development rules, and also excepting any newly constructed structures outside the established FEMA floodway on the Easement Property in accordance with floodplain development ordinances enforced by the local government agency and in accordance with FEMA floodplain development rules, and that no excavation shall be conducted and no fill placed on land within the established FEMA floodway without such approval as to the location and method of excavation and/or placement of fill and verification that the fill will not impact Project operation; the above estate is taken subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the property owners, their heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the Project for the purposes authorized by Congress or abridging the rights and easement hereby acquired; provided further that any use of the land shall be subject to Federal and State laws with respect to pollution.

B. Additionally under this Easement, Grantor grants to Grantee, its officers, employees, agents, representatives, contractors, and subcontractors, and the United States, the following access rights related to the Project regarding the Easement Property: ingress and egress in, on, over, across, and through the Access Area of the Easement Property as defined in the attached Exhibit X; removing structures, obstructions, and any other obstacles from the Access Area of the Easement Property; conducting observations, surveys, reviews, and data collection for environmental assessments; conducting topographic field and parcel surveys, soil analysis, soil borings, and other investigations; conducting water level, erosion, water quality, habitat,

environmental, and other relevant monitoring; performing any other testing, surveys, and analysis; and necessary and reasonable rights of ingress and egress to and from the Access Area of the Easement Property subject to the provisions regard crop damages below. Grantee shall notify Grantor prior to exercising the access provisions associated with this Agreement.

2. **Easement Runs With the Easement Property.** This Easement, and all covenants, terms, conditions, provisions, and undertakings created under this Easement, are perpetual and will run with the Easement Property, and will be binding upon Grantor's heirs, successors, and assigns.

3. **Removal of Unapproved Structures.** Grantor must remove all unapproved structures on the Easement Property on or before [Insert Date]. Any unapproved structures remaining on the Easement Property after **[Insert Date]**, will automatically become Grantee's property, without the need for any bill of sale or any other written instrument or agreement; Grantee may then remove any unapproved structures from the Easement Property, at its sole discretion and at its sole cost.

4. **Grantor Covenants.** Grantor warrants that Grantor is the fee simple owner of the Easement Property; that Grantor has the right to execute this Easement and to make the promises, covenants, and representations contained in this Easement; that this Easement does not violate any mortgage or other interest held by any third party regarding the Easement Property, or any portion of the Easement Property; that there are no outstanding unpaid bills incurred for labor, materials, or services regarding the Easement Property, or any portion of the Easement Property; and that there are no recorded or unrecorded liens, security interests, or any outstanding, pending, or threatened suits, judgments, executions, bankruptcies, or other proceedings pending or of record that would in any manner impact title to the Easement Property, or any portion of the Easement Property. Grantor will release, hold harmless, defend, and indemnify Grantee and its officers, agents, representatives, employees, and contractors from and against any and all claims, damages, injuries, or costs arising out of or in any way related to any title defects regarding the Easement Property.

5. **Taxes.** Grantor is solely responsible for all taxes and special assessments or assessments for special improvements due, levied, or assessed regarding the Easement Property for all past, present, and future years. Grantee will not be responsible for payment of any real estate taxes or special assessments regarding the Easement Property.

6. **Use of the Easement Property.**

A. Grantor's Use. Subject to the provisions of Sections 1 and 3, Grantor has the right and privilege to use the Easement Property at any time, in any manner, and for production of crops, pasture, and other farm-related activities and hunting, including the right to post the Easement Property at Grantor's sole discretion to restrict public hunting rights. Grantor will promptly cease any activities and remove any structures or obstructions that interfere with Grantee's use of the Easement Property, Grantee's rights and privileges under this Easement, or with the Project, when directed by Grantee. Grantor understands and recognizes any use of the Easement Property is at Grantor's sole risk, and that Grantee is not responsible for any damages to crops or for interference with any other of Grantor's uses

of the Easement Property as a result of any inundation or any of Grantee's other rights and privileges regarding the Easement Property.

B. Grantee's Entry. If Grantee enters upon the Easement Property for purposes of conducting any of the surveys or testing permitted under this Agreement, following the conclusion of any surveys or testing, Grantee will return the Easement Property as nearly as practicable to its previous condition, taking into consideration the nature of the work being performed; for example, Grantee will remove any dirt piles or equipment from the Easement Property that might unreasonably interfere with Grantor's permitted uses of the Easement Property. Grantee's ingress and egress rights to the Easement Property will be by the least intrusive means reasonable. Additionally, Grantee will reimburse Grantor for reasonable crop damages resulting from the Grantee's physical entrance upon the Easement Property for purposes of conducting such surveys or testing. Such reasonable crop damages shall be calculated based on the area disturbed, actual production history, Grantor's yields the year of the damages, and current crop prices at the time of the crop damages.

7. **Encumbrances.** Subject to the provisions below regarding the leasing or mortgaging of the Easement Property, Grantor will not encumber the Easement Property or any portion of the Easement Property or enroll the Easement Property or any portion of the Easement Property in any farm or other federal program that would be contrary to, or would in any way disrupt or interfere with, Grantee's use of the Easement Property, Grantee's rights and privileges under this Easement, or with the Project without first obtaining Grantee's consent. However, Grantor may rent or lease the Easement Property, at Grantor's sole discretion without first obtaining Grantee's consent. If Grantor rents or leases the Easement Property, any lessee's rights and uses are subject to this Easement, including the use restrictions described above; Grantor will be fully responsible to Grantee for Grantor's obligations under this Easement, including for any violations by any lessee. Additionally, Grantor may mortgage the Easement Property, at Grantor's sole discretion without first obtaining Grantee's consent so long as any mortgage is subordinate to this Easement.

8. **Waiver of Warranties.** The parties specifically agree neither Grantee nor any of its agents or representatives have made any representations or warranties in any way regarding the Project; Grantor's ability to use the Easement Property following construction of Project; the potential frequency of inundation of the Easement Property; Grantor's ability to enroll the Easement Property in any federal program; or Grantor's ability to obtain any farm insurance regarding the Easement Property.

9. **Maintenance.** Grantee's easement rights include the right, at its discretion and if necessary for purposes of proper operation and maintenance of the Project, to remove trees, underbrush, obstructions, and any other vegetation, structures, or obstacles from the Easement Property. However, Grantor is solely responsible, at Grantor's sole expense and discretion, for maintaining the Easement Property, including grass cutting and weed control, and debris removal following any inundation. Neither Grantor nor Grantee will store, cause, or permit any spillage, leakage, or discharge of fertilizers, herbicides, fungicides, and pesticides on the Easement Property (in excess of normal applications for farming purposes). Further, in no event will either party cause or permit any spillage, leakage, or discharge of any hazardous substance onto the Easement Property including, but not limited to, spillage of

petroleum products or vehicle fuels, gasoline, kerosene, or other products used for the purpose of generating power, lubrication, illumination, heating, or cleaning. If either party causes or permits any spillage, leakage, or discharge of any such hazardous substance onto the Easement Property, that party shall be solely responsible for any damages arising out of such spillage, leakage, or discharge of any such hazardous substance onto the Easement Property to the extent required by law.

10. **Forbearance or Waiver.** The failure or delay of Grantee to insist on the timely performance of any of the terms of this Easement, or the waiver of any particular breach of any of the terms of this Easement, at any time, will not be construed as a continuing waiver of those terms or any subsequent breach, and all terms will continue and remain in full force and effect as if no forbearance or waiver had occurred.

11. **Governing Law**. This Agreement will be construed and enforced in accordance with [Insert STATE] law. The parties agree any litigation arising out of this Agreement will be venued in State District Court in [Insert County, State], and the parties waive any objection to venue or personal jurisdiction.

12. **Severability**. If any court of competent jurisdiction finds any provision or part of this Easement is invalid, illegal, or unenforceable, that portion will be deemed severed from this Easement, and all remaining terms and provisions of this Easement will remain binding and enforceable.

13. **Entire Agreement**. This Easement constitutes the entire agreement between the parties regarding the matters described in this Easement, and this Easement supersedes all other previous oral or written agreements between the parties.

14. **Modifications**. Any modifications or amendments of this Easement must be in writing and signed by Grantor and Grantee and must be recorded with the [INSERT} County Recorder's office.

15. **Representation**. The parties, having been represented by counsel or having waived the right to counsel, have carefully read and understand the contents of this Easement, and agree they have not been influenced by any representations or statements made by any other parties.

16. **Headings**. Headings in this Easement are for convenience only and will not be used to interpret or construe its provisions.

(Signatures appear on the following pages.)

IN WITNESS WHEREOF, Grantor executed this Easement on the date written above.

GRANTOR:

_____
[Insert Name of Grantor]

_____
[Insert Name of Grantor]

STATE OF [INSERT])
) ss.
COUNTY OF [INSERT])

On this ____ day of _____, 201X, before me, a Notary Public, in and for said County and State, personally appeared [Insert Name of Grantor], [Insert Marital Status], known to me to be the persons described in and who executed the within and foregoing instrument, and acknowledged to me that they executed the same.

_____
Notary Public, State of [Insert]
My Commission Expires:

(SEAL)

GRANTEE:

[Acquiring Entity Name]

By: _____
[Name, Title]

ATTEST:

_____
[Name]
[Title]

STATE OF [INSERT])
) ss.
COUNTY OF [INSERT])

On this ____ day of _____, 201X, before me, a Notary Public, in and for said County and State, personally appeared [NAME] and [NAME], known to me to be the Chairman and Secretary-Treasurer, respectively, of the [Insert Acquiring Entity Name] and who executed the within and foregoing instrument, and acknowledged to me that they executed the same on behalf of the [Insert Acquiring Entity Name]

_____
Notary Public, [County, State]
My Commission Expires:

(SEAL)

The legal description contained in this document was prepared by:

[Insert Info of Surveyor]

Dispute Resolution Board

Introduction

In addition to acquiring the necessary property rights from property owners, the Diversion Authority will provide an informal, administrative forum for property owners to file claims for damages. The Diversion Authority will establish the Alternative Dispute Resolution Board for such purposes. It should be noted that the Dispute Resolution Board is modeled after a similar process created by the North Dakota State Water Commission (NDSWC) for the Devils Lake outlet project.

Intent

The Diversion Authority will create an Alternative Dispute Resolution Board as an administrative board to hear claims by property owners and parties claiming that their real property was damaged by floods alleged to have been caused by the Project. The Diversion Authority intends that all claims for damages will be heard by the Alternative Dispute Resolution Board prior to a party filing suit in a district court.

Jurisdiction

The Alternative Dispute Resolution Board is not intended to address claims relating to alleged negligence of the Diversion Authority, its contractors, agents, officers, employees or designees. Rather, it is intended to address claims based upon alleged flooding caused by the Project.

Purpose

The purpose of the Alternative Dispute Resolution Board is to provide a mechanism, other than resorting to filing an action with the North Dakota and/or Minnesota courts, for consideration of physical water damage resulting from operation of the Project. The Alternative Dispute Resolution Board will review each claim, utilize all available data, and make a determination if actual, physical damage was caused by the Project's operation.

Creation

The Diversion Authority will create the Alternative Dispute Resolution Board comprised of three (3) independent review officers. The resolution creating the Alternative Dispute Resolution Board shall address further details regarding membership qualifications, rules of practice and procedure, along with decision making requirements. A copy of the resolution will be provided to the NDSWC and MDNR, and included in a future version of this Mitigation Plan.

Composition

The Diversion Authority will adopt a list of qualifications to serve as independent review officers of the Alternative Dispute Resolution Board and will periodically approve a list of individuals to serve as independent review officers. The Diversion Authority intends that it will also solicit input from the county commissioners of counties in both North Dakota and Minnesota, which may be affected by the Project, prior to formally creating the Alternative Dispute Resolution Board, to select an independent review officer from each of the counties.

The Diversion Authority recognizes that some of the counties may choose not to participate and/or recommend independent review officers. Nonetheless, the Diversion Authority will make efforts to solicit input from and obtain a list of potential independent hearing officers from each of the counties affected by the Project.

It should be noted that the independent review officers of the Alternative Dispute Resolution Board will not be employees of the Diversion Authority.

Procedure

- Actions before the Alternative Dispute Resolution Board will commence upon the filing of a claim by a property owner with the Secretary of the Diversion Authority. A sample claim form is attached. Claims may not be filed until after the effective date of the resolution creating the Alternative Dispute Resolution Board.
- Once a claim is filed, the Secretary will select three (3) independent review officers in accordance with the resolution creating the Alternative Dispute Resolution Board.
- Following the assignment of independent review officers to preside over a claim, the Secretary will set a review date for the claim, not less than thirty (30) calendar days following the filing of the claim, and mail notice to the claimant of the date set for the review and the identity of the independent review officers.
- A claimant will have the right to request not less than ten (10) calendar days before the date of the review that an assigned independent review officer be removed from consideration of the claim. The request will be directed to the assigned independent review officer who will decide whether he or she cannot fairly or objectively review the claim. If an assigned independent review officer believes he or she cannot fairly or objectively review a claim, then he or she will recuse himself or herself and notify the Secretary. The Secretary will then assign another independent review officer to the claim. The Authority may also remove an assigned independent review officer from a claim by finding that the assigned independent review officer cannot fairly or objectively review the claim. If such a finding is made, then the Secretary will assign another independent review officer.
- At the review, the claimant will have the opportunity to present testimony and exhibits and question any witnesses. Strict rules of evidence will not apply. The Secretary must tape record the review and keep copies of all exhibits.
- The independent review officers must receive and give weight to evidence, including hearsay evidence, which possesses probative value commonly accepted by reasonable and prudent people in the conduct of their affairs. The vote of independent review officers must be by a majority.

Compensation for Damages

The Diversion Authority will compensate for damages through an operations and maintenance (O&M) funding program that will also be used for other O&M expenses. The O&M funding program will utilize either sales tax revenues or a maintenance district.

Release of All Claims

Prior to the payment of a compensation award as determined by the independent review officers, the Alternative Dispute Resolution Board will require that the property owner execute a release of all claims relating to the actual, physical damage.

Judicial Review

A claimant's use of the Alternative Dispute Resolution Board process will not preclude a claimant from filing an action seeking compensation for damages. A claimant may appeal the decision of the Alternative Dispute Resolution Board pursuant to appropriate state laws. If a claimant files an action, the Diversion Authority may, within its discretion, utilize the record of the Alternative Dispute Resolution Board how it sees fit.

ALTERNATIVE DISPUTE RESOLUTION BOARD
CLAIM AFFIDAVIT

Case No. _____

Full Name of Person(s) Filing Claim (PLAINTIFFS)			
Address	City	State	Zip
Telephone Number	Email Address		

Full Name of Person(s) From Whom You Are Seeking Damages (DEFENDANT)			
METRO FLOOD DIVERSION AUTHORITY			
Address	City	State	Zip
P.O. BOX 2806	FARGO	ND	58108-2806

PLAINTIFF/PLAINTIFFS claim the following damages from DEFENDANT: (Give a SHORT statement of the claim and reasons for the claim.)

_____

_____

_____

_____

_____

_____

(Attach additional sheet if necessary.)

TOTAL AMOUNT OF DAMAGES CLAIMED: $_____

LOCATION WHERE DAMAGES OCCURRED (Please circle one of the following):

Cass County, ND	Clay County, MN	Traill County, ND
Norman County, MN	Grand Forks County, ND	Polk County, MN
Wilkin County, MN	Richland County, ND	Other

_____
Plaintiff(s) Signature(s)

_____
Plaintiff(s) Signature(s)

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20___, before me, a Notary Public, in and for said County and State, personally appeared _____ _____, known to me to be the person(s) described in and who executed the within and foregoing instrument, and acknowledged to me that _____ executed the same.

(SEAL)

_____
Notary Public

Cemetery Mitigation Plan

Introduction

There are seven cemeteries upstream of the Diversion Project that may potentially be impacted by varying levels (ranging from 0.1 feet to 7.8 feet) of additional water due to operation of the Project in a 100-year (one-percent annual chance) flood.

Additionally, there are 19 cemeteries that currently would flood within the protected area that will now have improved flood protection due to construction of the Project.

During an information gathering stage, 54 cemeteries were visited to gain information and identify impacts that flooding has had on these sites, and what efforts have been utilized in the past to prevent and/or mitigate any such impacts. Following this effort, USACE released a "Cemetery Study" in 2014 that identifies the potential impacts of each site and several potential mitigation options.

Following the release of this initial USACE Cemetery Study, individual site visits and meetings with representatives from 11 of the upstream cemeteries were conducted. Cultural surveys were performed on eight of these 11 sites, three of which qualified for the National Register of Historic Places.

It should be noted that previous Project configuration impacted 11 upstream cemeteries, but the current Project configuration impacts seven upstream cemeteries. Maps of the impacted cemeteries are provided on the following pages.

Local Cemetery Mitigation Plan

The Diversion Authority has formed a Local Cemetery Mitigation Team with representatives from entities in North Dakota and Minnesota. With completion of the Federal Cemetery Mitigation Plan, and an understanding of the minimum federal requirements, the team will be responsible for building upon USACE's efforts and the creation of a local Cemetery Mitigation Plan.

Minimum Federal Mitigation Plan and Requirements

In 2015, a Federal Cemetery Mitigation Plan was released by USACE. This plan identifies specific mitigation options for each of the impacted cemetery locations; including, protective berms, access changes, debris fencing, anchoring headstones, and/or raising the site. The previously completed cemetery studies can be found at www.fmdiversion.com/studies-technical-documents/. This analysis will be amended with data from the current Project configuration.

The Federal requirements are that flowage easements be obtained on the impacted cemeteries within the floodway, as is required for operation of the Project. There are no federal mitigation requirements for the other potentially-impacted cemeteries located outside the floodway.

The plan found:

- None of the Project induced flooding would be more frequent than once every 20 years, on average.
- Past flooding has caused minimal damage to cemeteries in the area, and the Project induced flooding is also anticipated to only cause minor damage.
- For less-frequent events (50-yr, 100-yr), impacts are of limited duration, infrequent, and are anticipated to cause minimal physical damage.

Clean-Up Assistance

In addition to obtaining a flowage easement, the Diversion Authority will adopt a post-operation repair and debris clean-up program and ensure the impacted cemeteries are eligible to take part in the repair and clean-up assistance program. The program will not only accommodate collection of debris that may accumulate on the cemetery sites, but it will also provide for reimbursement of repair costs that may be necessary to correct physical damage to the cemetery caused by operation of the Project. Please see the public lands repair and debris clean-up plans detail elsewhere in the Property Rights Acquisition and Mitigation Plan.

National Register of Historic Places

For the cemeteries that are eligible to be listed on the National Register of Historic Places (HRHP) (Hemnes Cemetery, Clara Cemetery, and Lower Wild Rice Cemetery), and any additional cemetery that may be identified on the NRHP, USACE and the Diversion Authority will work with each respective State Historic Preservation Office (SHPO) to assure compliance with Section 106 and 36 C.F.R. 800 prior to operation of the Project.

Cemetery Mitigation Alternatives

In addition to the federally-required flowage easements, the Federal Cemetery Mitigation Plan that was completed in 2015 included a table of mitigation alternatives for each of the impacted sites. The mitigation alternatives includes estimated costs for a variety of options, including: berms, offsite access, fencing and the anchoring of headstones, and raising the elevation of the land itself.

In addition to the estimated costs, it should be noted that the federal study identified a number of technical aspects and the potential for adverse effects on historic integrity that may make one or more of the mitigation alternatives infeasible to be utilized on some sites. It is also recognized that some of the alternative mitigation measures could adversely impact properties adjacent to the cemeteries.

In conjunction with the Local Cemetery Mitigation Team, the Diversion Authority will work to meet with each cemetery representative to discuss the technically feasible options for each specific location. The Diversion Authority understands that there will not be a one-size-fits-all approach to cemetery mitigation as each site location provides a unique situation that varies across the area. In addition, the information and feasible options for each site may also vary, and the Diversion Authority will respect each when formulating what works best for each cemetery. Consideration for larger-than the 100-year

flood event will be made when developing final mitigation decisions. Those considerations should include adequate design, technical feasibility, and cost.

Attachments

- Impacted Cemetery Summary Table
- Impacted Cemetery Overview Map
- Impacted Cemetery Maps (7 pages)

Cemetery	Approx. Lowest Site Elevation	50-year Flood Event					100-year Flood Event					Upstream Mitigation Area		
		Existing Peak WSEL	Existing Total Depth (ft)	With Project Peak WSEL	With Project Total Depth (ft)	Additional Depth (ft)	Existing Peak WSEL	Existing Total Depth (ft)	With Project Peak WSEL	With Project Total Depth (ft)	Additional Depth (ft)	Revision Reach Area	Takings Analysis Area	Flowage Easement Area
Clara	915.0	913.4	0.0	919.1	4.1	4.1	914.7	0.0	921.1	6.1	6.1	Yes	No	Yes
Eagle Valley	924.0	922.2	0.0	922.8	0.0	0.0	925.0	1.0	925.5	1.5	0.5	Yes	No	Yes
Hemnes	922.0	916.7	0.0	920.0	0.0	0.0	918.8	0.0	922.0	0.0	0.0	Yes	No	Yes
Lower Wild Rice and Red River	908.0	912.1	4.1	919.0	11.0	6.9	913.1	5.1	920.9	12.9	7.8	Yes	No	Yes
North Pleasant	921.0	919.7	0.0	919.9	0.0	0.0	920.1	0.0	921.1	0.1	0.1	Yes	No	Yes
Roen Family	917.0	915.1	0.0	919.5	2.5	2.5	916.8	0.0	921.5	4.5	4.5	Yes	No	Yes
Wolverton	923.0	923.6	0.6	923.9	0.9	0.3	926.4	3.4	926.7	3.7	0.3	No	Yes	No

Rustad
Clay County
Cass County
Oxbow
Comstock
Wilkin County
Christine
Wolverton
Richland County
Walcott
21
16
36
17S
18
46
29
26
1
2
25
81
180
75

Legend

- Impacted Cemeteries in Upstream Mitigation Area
- Alignment Centerline (Plan B)
- Levee
- Flowage Easement Area
- Revision Reach Area
- Takings Analysis Area

Impacted Cemeteries in the Upstream Mitigation Area
FM Area Diversion Project

N
W
E
S

0 0.6 1.2 2.4 Miles

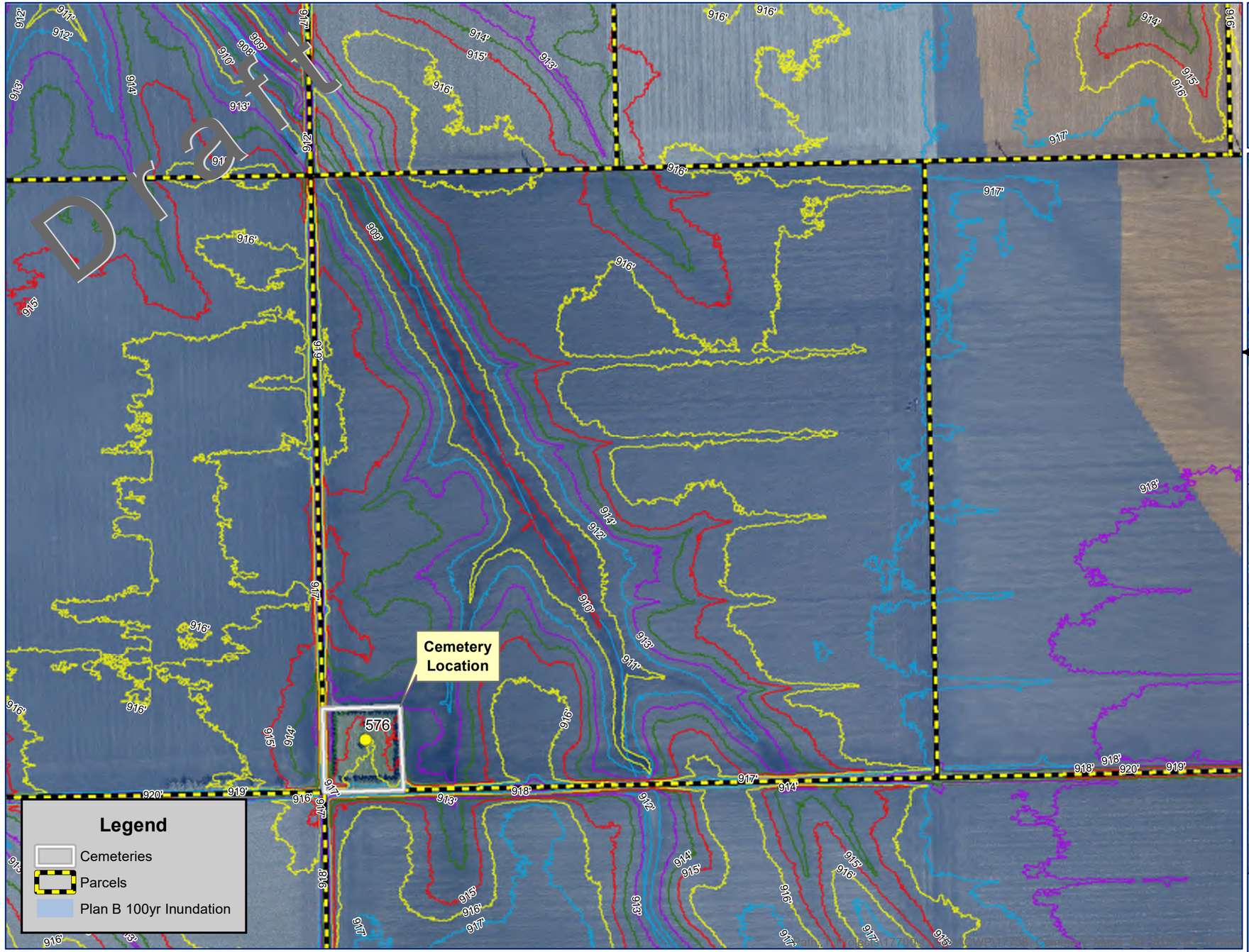
FM AREA DIVERSION PROJECT

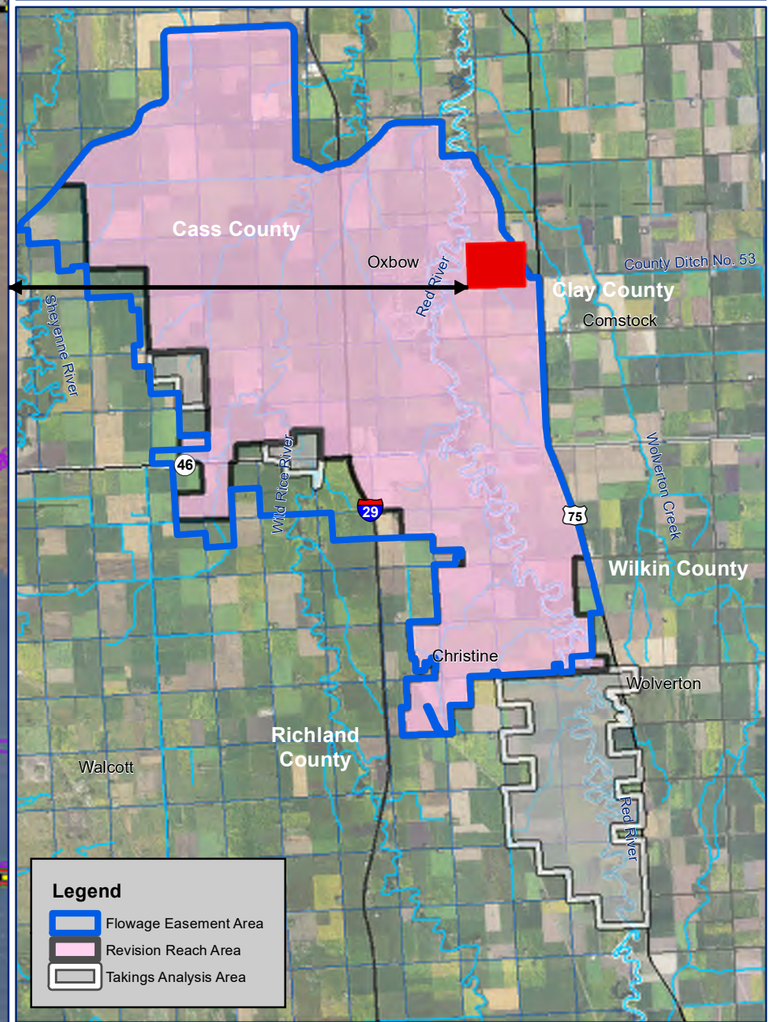
Created By: KMV Date Created: 12/05/16 Date Saved: 03/15/18 Date Exported: 03/15/18
Plotted By: benjamin.kugler Parcel Date: Varies Aerial Image: 2015/6 County NAIP SIDS Elevation Data: Lidar
Horizontal Datum: NAD 1983 StatePlane North Dakota South FIPS 3302 Feet Vertical Datum: NAVD1988
T:\Projects\17700\17738\ACWP\Protected_Staging_AreasCemeteteries2018_03_09.mxd

Cemetery Map

Clara Cemetery

Draft





Return Frequency	Existing Conditions		With Project	
	Peak Water	Duration (Days) of WSEL Above 915	Peak Water	Duration (Days) of WSEL Above 915
50-Year	913.4	0	919.1	7
100-Year	914.7	0	921.1	9.5

Cemetery: Clara Cemetery

FM AREA DIVERSION PROJECT

N W E S

0 230 460 920 Feet

Name: KLEIN ROBERT H

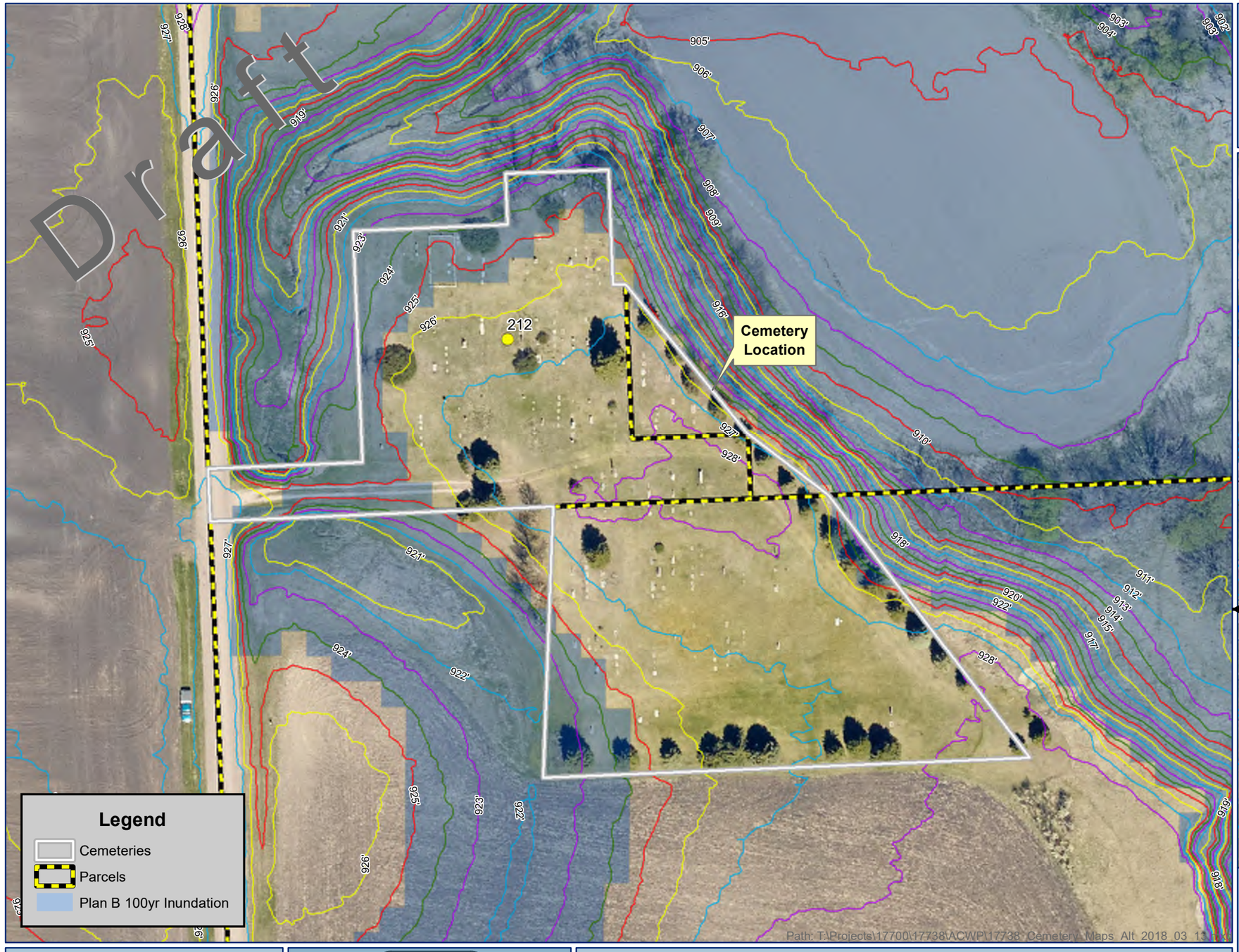
Pin: 150173000

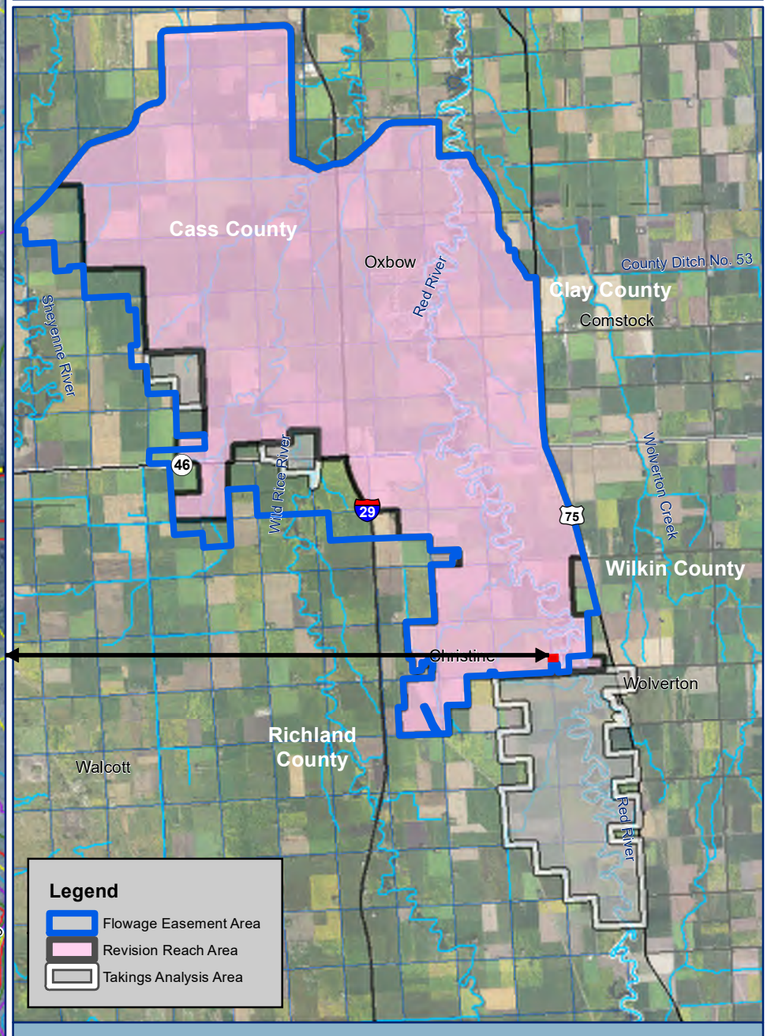
County: Clay County, MN

PDF Date: 3/15/2018

Cemetery Map

Eagle Valley Evangelical Cemetery





Return Frequency	Existing Conditions		With Project	
	Peak Water	Duration (Days) of WSEL Above 924	Peak Water	Duration (Days) of WSEL Above 924
50-Year	922.2	0	922.8	0
100-Year	925.0	3	925.5	5.5

Cemetery: Eagle Valley Evangelical Cemetery

FM AREA DIVERSION PROJECT

N W E S

0 30 60 120 Feet

Name: EAGLE VALLEY EVANGELICAL

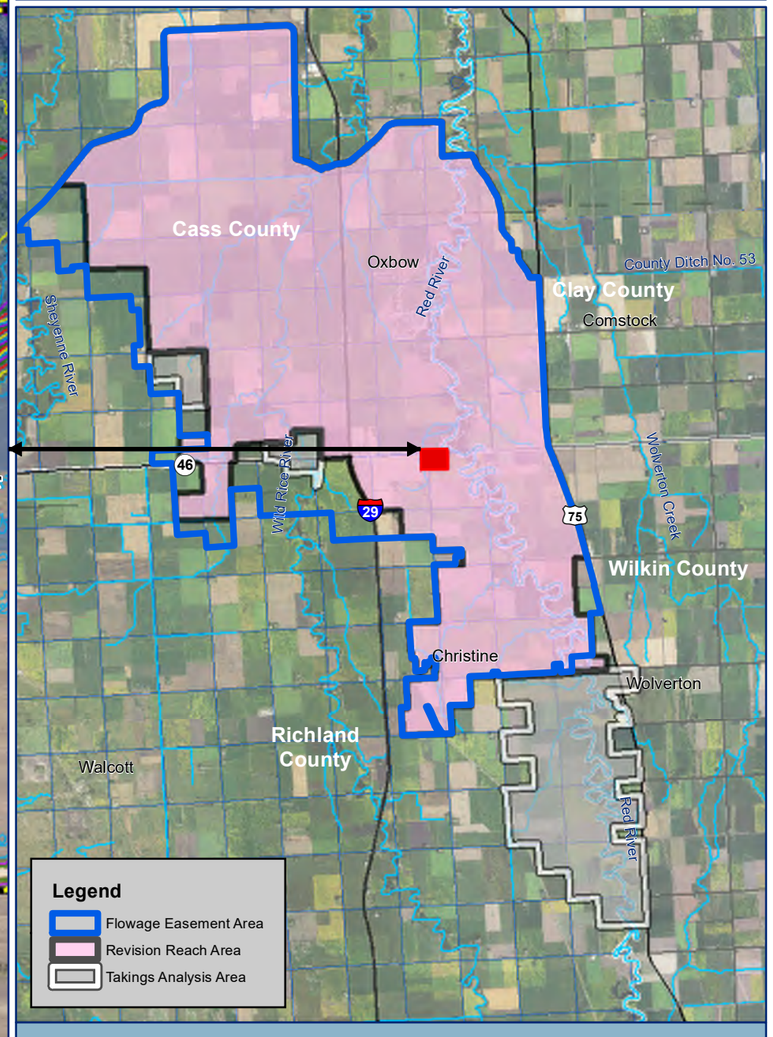
Pin: 1000000030200
1000000029000

County: Richland County, ND

PDF Date: 3/15/2018

Cemetery Map

Hemnes Cemetery



Return Frequency	Existing Conditions		With Project	
	Peak Water	Duration (Days) of WSEL Above 922	Peak Water	Duration (Days) of WSEL Above 922
50-Year	916.7	0	920.0	0
100-Year	918.8	0	922.0	0

Cemetery: Hemnes Cemetery

FM AREA DIVERSION PROJECT

N W E S

0 105 210 420 Feet

Name: YSTEBO, STUART T&LAVERNA LLLP

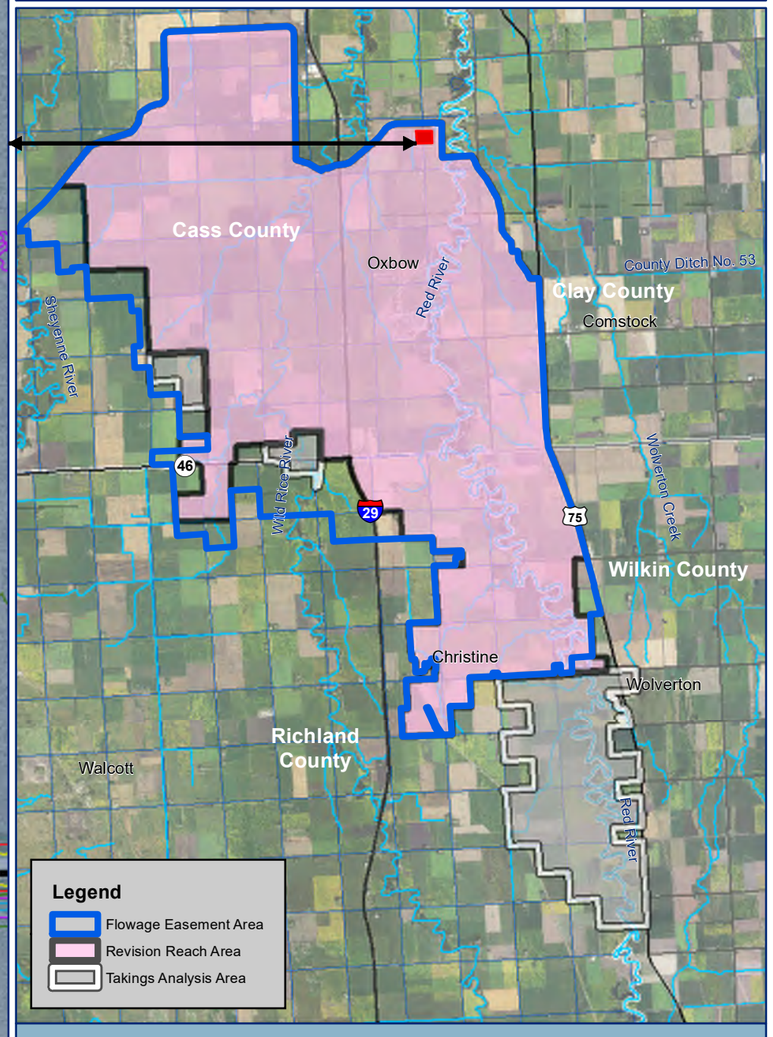
Pin: 1000000066000

County: Richland County, ND

PDF Date: 3/15/2018

Cemetery Map

Lower Wild Rice and Red River Cemetery



FM AREA DIVERSION PROJECT

N W E S

0 62.5 125 250 Feet

Name: NORWEGIAN EVANGELICAL LUTHERAN CHURCH

Pin: 57000010201126

County: Cass County, ND

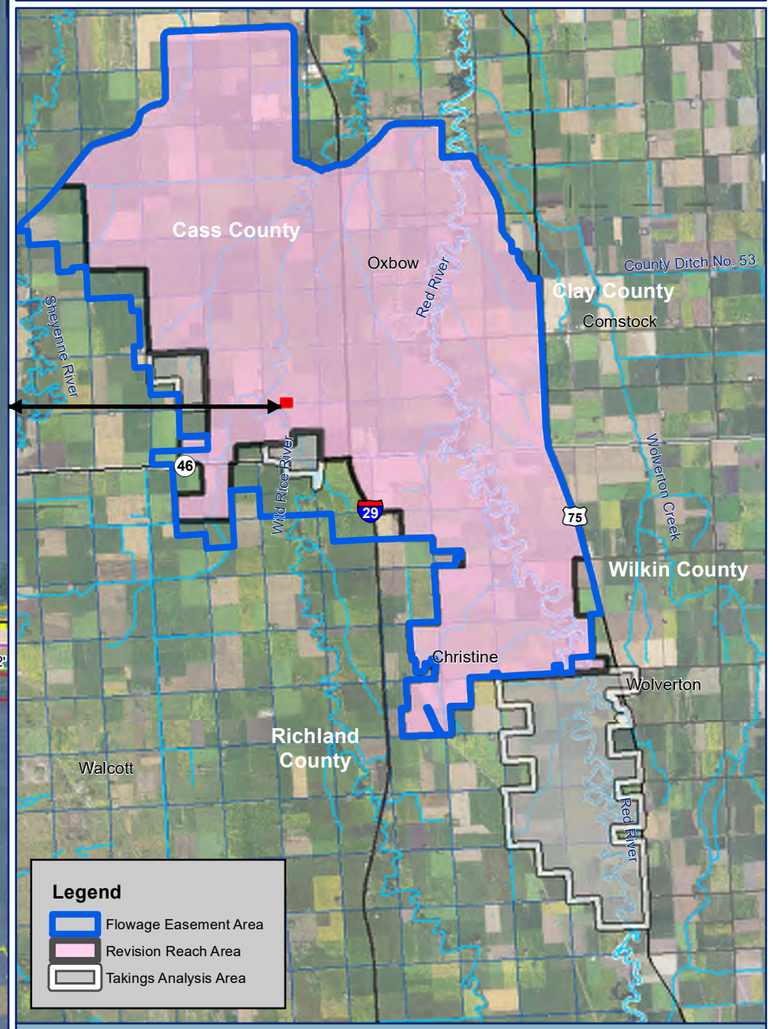
PDF Date: 3/15/2018

Return Frequency	Existing Conditions		With Project	
	Peak Water	Duration (Days) of WSEL Above 908	Peak Water	Duration (Days) of WSEL Above 908
50-Year	912.1	11.5	919.0	17.5
100-Year	913.1	17	920.9	18

Cemetery: Lower Wild Rice and Red River Cemetery

Cemetery Map

North Pleasant Cemetery



FM AREA DIVERSION PROJECT

N W E S

0 40 80 160 Feet

Name: NORTH PLEASANT CEMETERY ASSOCIATION

Pin: 57000010375020

County: Cass County, ND

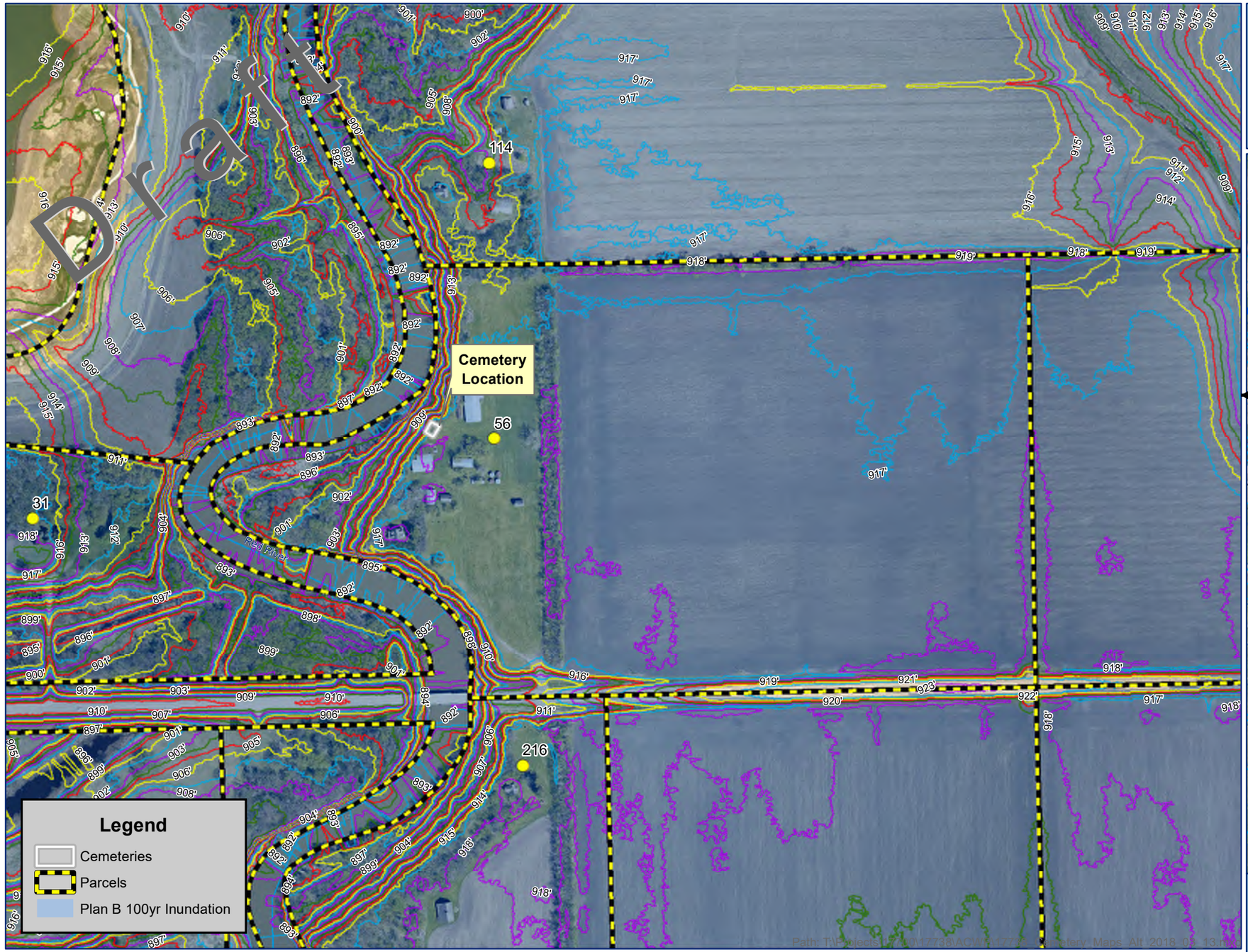
PDF Date: 3/15/2018

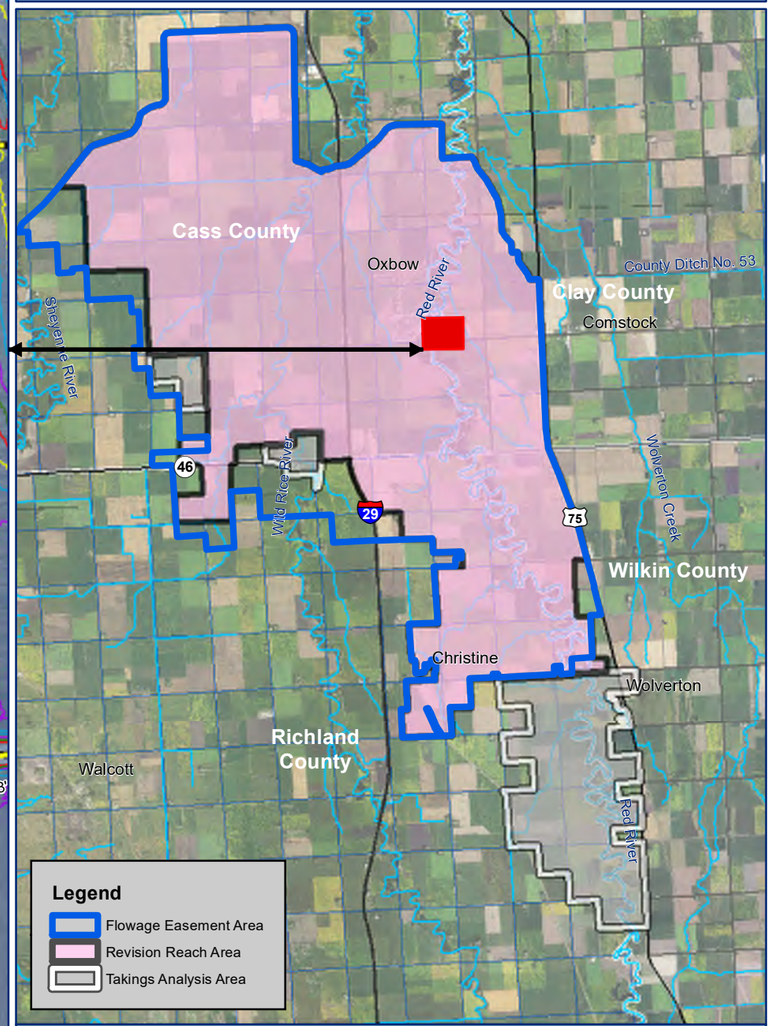
Return Frequency	Existing Conditions		With Project	
	Peak Water	Duration (Days) of WSEL Above 921	Peak Water	Duration (Days) of WSEL Above 921
50-Year	919.7	0	919.9	0
100-Year	920.1	0	921.1	1.5

Cemetery: North Pleasant Cemetery

Cemetery Map

Roen Family Cemetery





Return Frequency	Existing Conditions		With Project	
	Peak Water	Duration (Days) of WSEL Above 917	Peak Water	Duration (Days) of WSEL Above 917
50-Year	915.1	0	919.5	6
100-Year	916.8	0	921.5	9

Cemetery: Roen Family Cemetery

FM AREA DIVERSION PROJECT

N W E S

0 165 330 660 Feet

Name: UELAND RHODA K

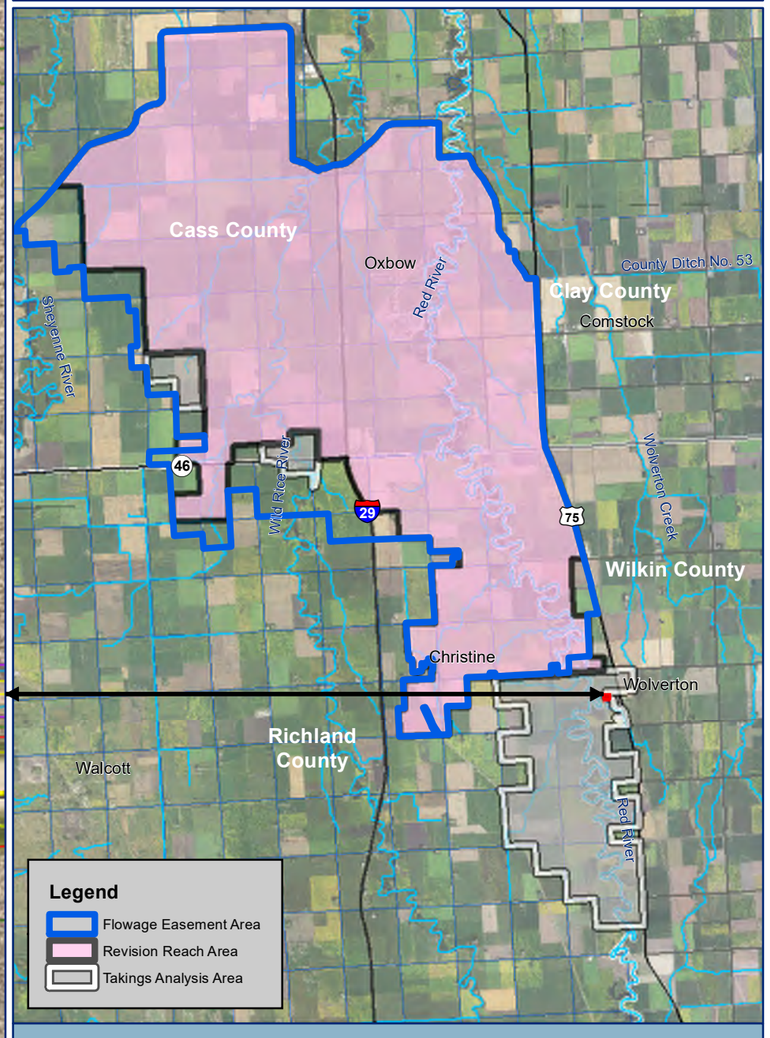
Pin: 150193400

County: Clay County, MN

PDF Date: 3/15/2018

Cemetery Map

Wolverton Cemetery



Return Frequency	Existing Conditions		With Project	
	Peak Water	Duration (Days) of WSEL Above 923	Peak Water	Duration (Days) of WSEL Above 923
50-Year	923.6	2	923.9	4.5
100-Year	926.4	6.5	926.7	9

Cemetery: Wolverton Cemetery

FM AREA DIVERSION PROJECT

N W E S

0 25 50 100 Feet

Name: SWEDISH EVANGELICAL LUTHERAN FAITH LUTHERAN CHURCH

Pin: 31-028-0050
31-028-0040

County: Wilkin County, ND

PDF Date: 3/15/2018

Mitigation of Historic Properties

The Diversion Authority, USACE, and State Historical Preservation Offices from North Dakota and Minnesota have entered into a Programmatic Agreement to address preservation and mitigation of historical properties. The Programmatic Agreement and Amendment No. 1 are attached.

Attachments

- Programmatic Agreement (11 pages)
- Amendment No. 1 (3 pages)

PROGRAMMATIC AGREEMENT AMONG THE U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT, THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER, AND THE MINNESOTA STATE HISTORIC PRESERVATION OFFICER REGARDING THE FARGO-MOORHEAD METRO FLOOD RISK MANAGEMENT PROJECT, CASS COUNTY, NORTH DAKOTA AND CLAY COUNTY, MINNESOTA

Final – 2011

WHEREAS, the St. Paul District, U.S. Army Corps of Engineers (Corps) is conducting a feasibility study of flood risk management measures for the cities of Fargo, Cass County, North Dakota and Moorhead, Clay County, Minnesota; and

WHEREAS, the Corps is considering the following flood risk management measures for the Fargo Moorhead metropolitan area and adjacent county areas (Figures 1 and 2): (1) a diversion channel capable of passing 20,000 cfs on the west (North Dakota) side of the Red River of the North along with upstream storage and staging areas, (Locally Preferred Plan [LPP] alternative) and (2) a diversion channel capable of passing 35,000 cfs on the east (Minnesota) side of the Red River of the North (Federally Comparable Plan [FCP] alternative).

WHEREAS, the necessary cultural resources investigations, evaluations, and coordination for compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, cannot be completed by the Corps or its agent prior to starting the design stage of the Fargo-Moorhead Metropolitan Flood Risk Management Project (Project); and

WHEREAS, the Corps has established the Project's Area of Potential Effects (APE), as required by 36 CFR § 800.4(a)(1) and defined in section 800.16(d), as consisting of the footprint of the selected diversion plan including the diversion channel alignment, its associated tieback levee(s), associated construction work areas, construction staging areas, borrow areas, and disposal areas, as well as associated upstream water storage and water staging areas, project-related floodproofing locations, and the viewshed to one-half mile from the diversion channel's centerline, to one-eighth mile from the tieback levee's centerline, and to one-eighth mile outside the storage area boundary levee's centerline; and

WHEREAS, the Corps has determined that the Project may have effects on historic properties within the APE and has consulted with the Advisory Council on Historic Preservation (Advisory Council) pursuant to section 800.2(b) of the regulations (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act (16 U.S.C. § 470f), and the Advisory Council has declined to participate in the Programmatic Agreement for this Project; and

WHEREAS, the City of Fargo, North Dakota, and the City of Moorhead, Minnesota (Cities), as the non-Federal sponsors for the Project, have participated in consultation on the Project's flood risk management measures and have been invited to concur in this Programmatic Agreement as consulting parties; and

WHEREAS, Cass County in North Dakota and Clay County in Minnesota are also interested parties and have been invited to participate in consultation on the Project's flood risk management measures and to concur in this Programmatic Agreement as consulting parties; and

WHEREAS, the Corps' St. Paul District Engineer initially contacted the chairman or chairwoman of the Sisseton-Wahpeton Oyate, the White Earth Band of Minnesota Chippewa, the Leech Lake Band of Ojibwe, the Turtle Mountain Band of Chippewa, the Upper Sioux Community of Minnesota, the Lower Sioux Indian Community, the Spirit Lake Tribe, and the Red Lake Band of Chippewa Indians, by letter dated April 8, 2009; initially contacted the chairman or chairwoman of the Bois Forte Band of Chippewa Indians, the Three Affiliated Tribes (Mandan, Hidatsa and Arikara Nation), the Northern Cheyenne Tribe, the Standing Rock Sioux Tribe, the Yankton Sioux Tribe, and the Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, by letter dated October 7, 2010; and initially contacted the chairman of the Crow Creek Sioux Tribe and the Flandreau Santee Sioux Tribe, by letter dated May 2011, to determine these tribes' interest in the Project, particularly regarding potential Project effects on properties important to their history, culture, or religion, including traditional cultural properties, and the Corps will consult with any of these tribes interested in this Project; and

WHEREAS, opinions and comments on the Project and its alternative alignments have been and will be solicited through comment periods on the Environmental Impact Statement and public meetings, including those held to comply with the National Environmental Policy Act (NEPA);

NOW THEREFORE, the Corps, the North Dakota State Historic Preservation Officer (SHPO), and the Minnesota State Historic Preservation Officer agree that upon filing this Programmatic Agreement (PA) with the Advisory Council on Historic Preservation, the Corps will implement the following stipulations in order to comply with Section 106 of the National Historic Preservation Act, as amended, with respect to the Project.

STIPULATIONS

The Corps will ensure that the following measures are carried out prior to the start of construction on Project flood risk management features at the cities of Fargo, Cass County, North Dakota, and Moorhead, Clay County, Minnesota:

A. The Corps will ensure that archeologists, historians, and architectural historians meeting the professional qualification standards given in the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* will conduct or directly supervise all cultural resources identification, evaluation, and mitigation related to this Project, to include archeological surveys and testing, historic structure inventories and evaluation, and data recovery and documentation mitigation, and be permitted in North Dakota pursuant to North Dakota Century Code Section 55-03-01 and in Minnesota pursuant to Minnesota Statutes Sections 138.31 to 138.42.

B. Literature and Records Search – Prior to conducting any cultural resources fieldwork, the Corps or its contractors or the Cities' contractors shall at a minimum consult the site files, previous survey reports, and other documents at the Historic Preservation Division of the State Historical Society of North Dakota at Bismarck and at the State Historic Preservation Office at the Minnesota Historical Society in St. Paul, for information on previously recorded cultural resources sites, site leads, and previously surveyed areas in the Project's APE.

C. Phase I Cultural Resources Investigation – The Corps or its contractors or the Cities' contractors will conduct a Phase I survey of all previously uninventoried project areas in order to locate any cultural resources (prehistoric, historic, and architectural) within the Project's APE. The cultural resources investigation will be an intensive, on-the-ground study of the area sufficient to determine the number and extent of the resources present and their relationships to Project features. The archeological investigations will take into account the unique geomorphology of the Red River Valley, and the potential for deeply buried soils. The survey also will consider and address visual effect impacts of proposed above-ground components (e.g., tieback levees) to cultural resources and landscapes within the project APE.

D. Phase II Testing and Evaluation – The Corps or its contractors or the Cities' contractors will evaluate the National Register of Historic Places eligibility of all cultural resources sites or structures over 50 years old located within the APE. Evaluation shall include subsurface testing using one-meter by one-meter excavation units to determine the information potential of prehistoric and historic archeological sites and archival research for historic archeological and architectural sites. The Corps will request the concurrence of the North Dakota SHPO or Minnesota SHPO, whichever is applicable, in determining each such site or structure's eligibility or non-eligibility to the National Register.

E. Phase III Mitigation – The Corps will avoid or minimize Project-related adverse effects to historic properties (National Register of Historic Places-listed or eligible sites, structures, buildings, districts, or objects) to the extent practicable. Where adverse effects due to the Project are not avoidable, the Corps will coordinate and implement a Memorandum of Agreement (MOA) with the North Dakota and/or Minnesota SHPO and the other consulting parties, any affected Indian tribes, and other interested parties, as applicable, to mitigate the adverse effects.

F. Burials – If any human burials are encountered during the cultural resources field work or Project construction, the Corps and its contractors and the Cities' contractors will comply with the Native American Graves Protection and Repatriation Act (NAGPRA) for federal or tribal lands, or with North Dakota Century Code Section 23-06-27, "Protection of Human Burial Sites, Human Remains, and Burial Goods," and North Dakota Administrative Code Chapter 40-02-03, "Protection of Prehistoric and Historic Human Burial Sites, Human Remains, and Burial Goods," for all other lands in North Dakota, or with Minnesota Statutes Section 307.08, Minnesota Private Cemeteries Act, for all other lands in Minnesota, whichever is applicable.

G. Traditional Cultural Properties – The Corps or its contractor will consult and coordinate with the tribes listed in the 8th WHEREAS clause above to identify sites of traditional religious or cultural importance to the tribe or their members within the Project area. Such sites shall be

avoided or adverse effects to them minimized to the extent practicable and the remaining effects mitigated per a MOA developed between the Corps, the applicable SHPO, and the affected tribe(s). Specific cultural and locational information on Traditional Cultural Properties (TCPs) is considered sensitive information by the tribes. Only general descriptions and general locational information will be released to the general public, unless otherwise required by law.

H. Curation – The Corps or its contractors or the Cities' contractors shall ensure that all materials and records resulting from the survey, evaluation, and data recovery or mitigation conducted for the Project, or recovered during Project construction, will be curated in accordance with 36 CFR Part 79, "Curation of Federally-Owned and Administered Archeological Collections" at a facility within the state of North Dakota or the state of Minnesota, depending upon the location of the cultural resources fieldwork or site(s) being investigated, unless the private landowner wishes to retain ownership of artifacts recovered from his/her land.

I. Construction Monitoring – In order to minimize or avoid construction delays, monitoring of construction earthwork by a qualified professional archeologist is recommended at certain Project locations, such as river terraces, oxbows, and floodplains, which have a high potential for deeply buried archeological resources that cannot be reached by normal archeological subsurface testing methods. Any monitoring at a TCP location will also have a knowledgeable tribal representative present or available. The Corps will determine which specific locations should have construction monitoring based upon the results of the Phase I cultural resources investigation and the TCP study (Stipulations C and G above) and available soils and geomorphology information.

J. Discoveries During Project Implementation – Should an unidentified site or property that may be eligible for inclusion in the National Register be discovered during Project construction, the Corps will cease all work in the vicinity of the discovered property until it can be evaluated pursuant to guidelines in Stipulation D of this Programmatic Agreement. If the property is determined to be eligible, the Corps shall comply with the provisions of Stipulation E above. Project actions which are not in the area of the discovery may proceed while the consultation and any necessary evaluation and mitigation work is conducted.

K. Reports – The Corps shall ensure that draft and final reports resulting from actions pursuant to the Stipulations of this Programmatic Agreement will be provided to the appropriate SHPOs, the non-Federal sponsors, and upon request, to other parties to this agreement. All parties will have 30 days to review and comment on any draft reports furnished to them.

ADMINISTRATIVE PROCEDURES

L. Dispute Resolution – Should the North Dakota SHPO, the Minnesota SHPO, or a concurring party to the PA object to any plans, documents, or reports prepared under the terms of this PA within 30 days after receipt, the Corps shall consult with the party to resolve the objection. If the Corps determines that the objection cannot be resolved, the Corps shall forward all documentation relevant to the dispute to the Advisory Council. Any recommendation or comment provided by the Advisory Council will be understood to pertain only to the subject of

the dispute. The Corps' responsibility to carry out all actions under this PA that are not the subject of the dispute will remain unchanged.

M. Amendments – Any party to this PA may request that it be amended, whereupon the parties will consult to consider such amendment. The PA may only be amended with the written concurrence of all parties who have signed the PA.

N. Anti-Deficiency Provision – All obligations on the part of the Corps under this PA shall be subject to the appropriation, availability and allocation of sufficient funds to the St. Paul District for such purposes.

O. Termination

1. Proof of compliance with the Stipulations to the satisfaction of the Corps, the North Dakota SHPO and the Minnesota SHPO will constitute termination of this Programmatic Agreement.

2. If the terms of this PA have not been implemented fifteen years after execution, this agreement will be null and void. In such an event, the Corps shall notify the North Dakota SHPO and the Minnesota SHPO of its expiration, and if appropriate, shall re-initiate review of the undertaking in accordance with 36 CFR part 800.

3. Any signatory party to this PA may withdraw from it by providing thirty (30) days notice to the other parties, provided that the parties will consult during the period prior to withdrawal to seek agreement on amendments or other actions that would avoid withdrawal. In the event of termination, or withdrawal, the Corps will comply with federal regulation 36 CFR part 800, Protection of Historic Properties.

Execution of this Programmatic Agreement, its subsequent filing with the Advisory Council, and implementation of its Stipulations evidences that the Corps has taken into account the effects of the Project on National Register listed or eligible historic properties, and has satisfied its Section 106 responsibilities for all aspects of this undertaking.

ST. PAUL DISTRICT, U.S. ARMY CORPS OF ENGINEERS

BY: _____ Date: 29 June 2011
~~LTC. Kendall A. Bergmann~~, Acting District Engineer
Jud. th L. A. DesHarnais

NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER

BY: _____ Date: July 13, 2011
Merlan E. Paaverud, Jr., State Historic Preservation Officer

MINNESOTA STATE HISTORIC PRESERVATION OFFICER

BY: _____ Date: 6/29/11
Britta Bloomberg, Deputy State Historic Preservation Officer

Concur:

CITY OF FARGO

BY: _____ Date: 7-11-11
Dennis Walaker, Mayor

CITY OF MOORHEAD

BY: _____ Date: 7-6-2001
Mark Voxland, Mayor

BY: _____ Date: 7-6-11
Michael J. Redlinger, City Manager

CASS COUNTY BOARD OF COMMISSIONERS

BY: _____ Date: 7-6-11
Darrell Vanyo, Chairman

CLAY COUNTY BOARD OF COMMISSIONERS

BY: _____ Date: 7/6/11
Jon Evert, Chairman

Concur:

SISSETON WAHPETON OYATE

BY: _____ Date: _____
Robert Shepherd, Chairman

WHITE EARTH BAND OF MINNESOTA CHIPPEWA

BY: _____ Date: _____
Erma Vizenor, Chairwoman

LEECH LAKE BAND OF OJIBWE

BY: _____ Date: July 26, 2011
~~Arthur "Archie" LaRose, Chairman~~
GINA LEMON, LLTHPO

TURTLE MOUNTAIN BAND OF CHIPPEWA

BY: _____ Date: _____
Merle St. Claire, Chairman

UPPER SIOUX COMMUNITY OF MINNESOTA

BY: _____ Date: _____
Kevin Jensvold, Chairman

LOWER SIOUX INDIAN COMMUNITY

BY: _____ Date: _____
Gabe Prescott, President

Concur:

SPIRIT LAKE TRIBE

BY: _____ Date: _____
Roger Yankton, Sr., Chairman

BOIS FORTE BAND OF CHIPPEWA INDIANS

BY: _____ Date: _____
Kevin Leecy, Chairman

THREE AFFILIATED TRIBES (MANDAN, HIDATSA AND ARIKARA NATION)

BY: _____ Date: _____
Tex G. Hall, Chairman

NORTHERN CHEYENNE TRIBE

BY: _____ Date: _____
Leroy Spang, President

STANDING ROCK SIOUX TRIBE

BY: _____ Date: _____
Charles W. Murphy, Chairman

ASSINIBOINE AND SIOUX TRIBES OF THE FORT PECK INDIAN RESERVATION

BY: _____ Date: _____
A.T. "Rusty" Stafne, Chairman

Concur:

YANKTON SIOUX TRIBE

BY: _____ Date: _____
Robert Cournoyer, Chairman

CROW CREEK SIOUX TRIBE

BY: _____ Date: _____
Duane Big Eagle, Sr., Chairman

FLANDREAU SANTEE SIOUX TRIBE

BY: _____ Date: _____
Anthony Reider, President

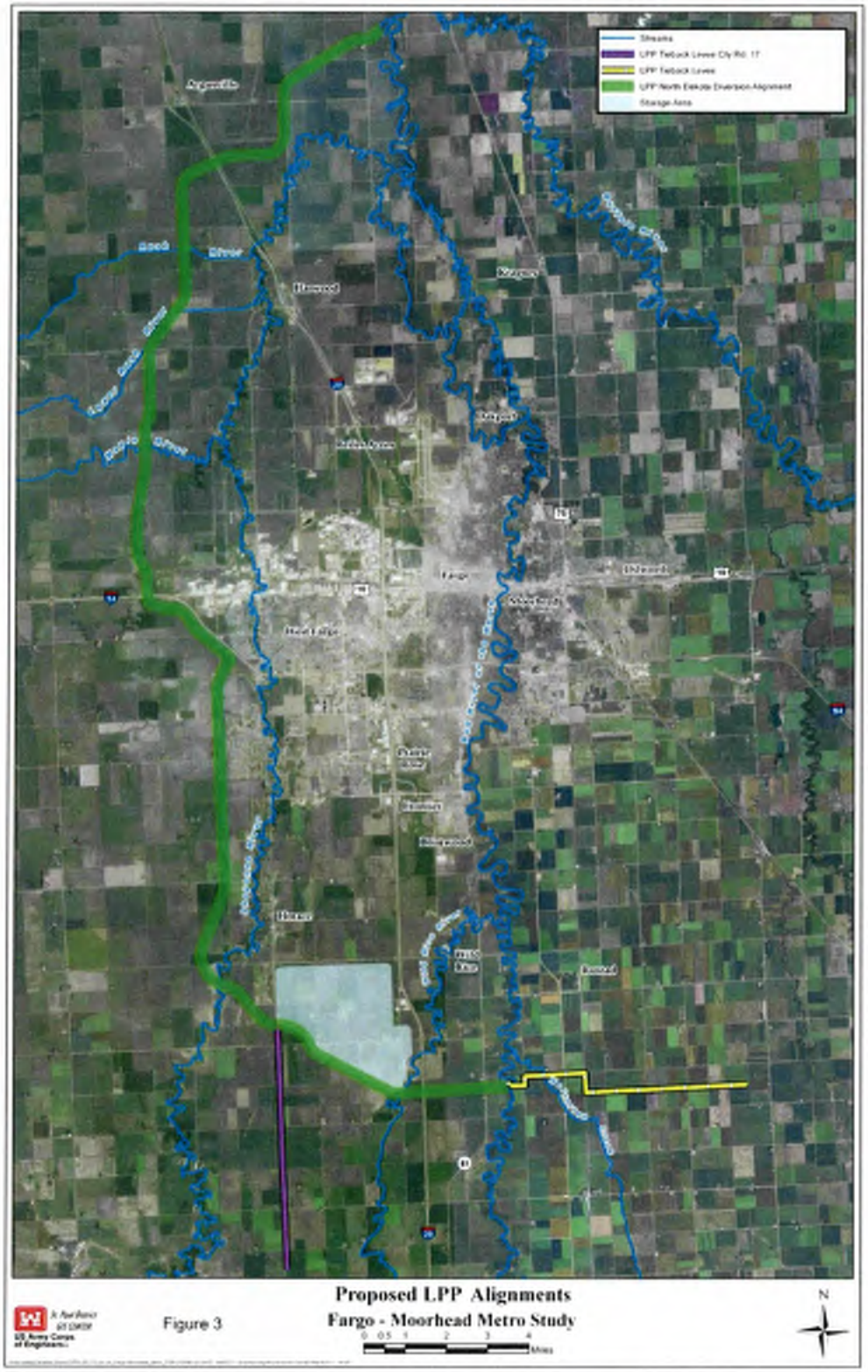


Figure 1. Proposed North Dakota Diversion alignments (Locally-Preferred Plan).

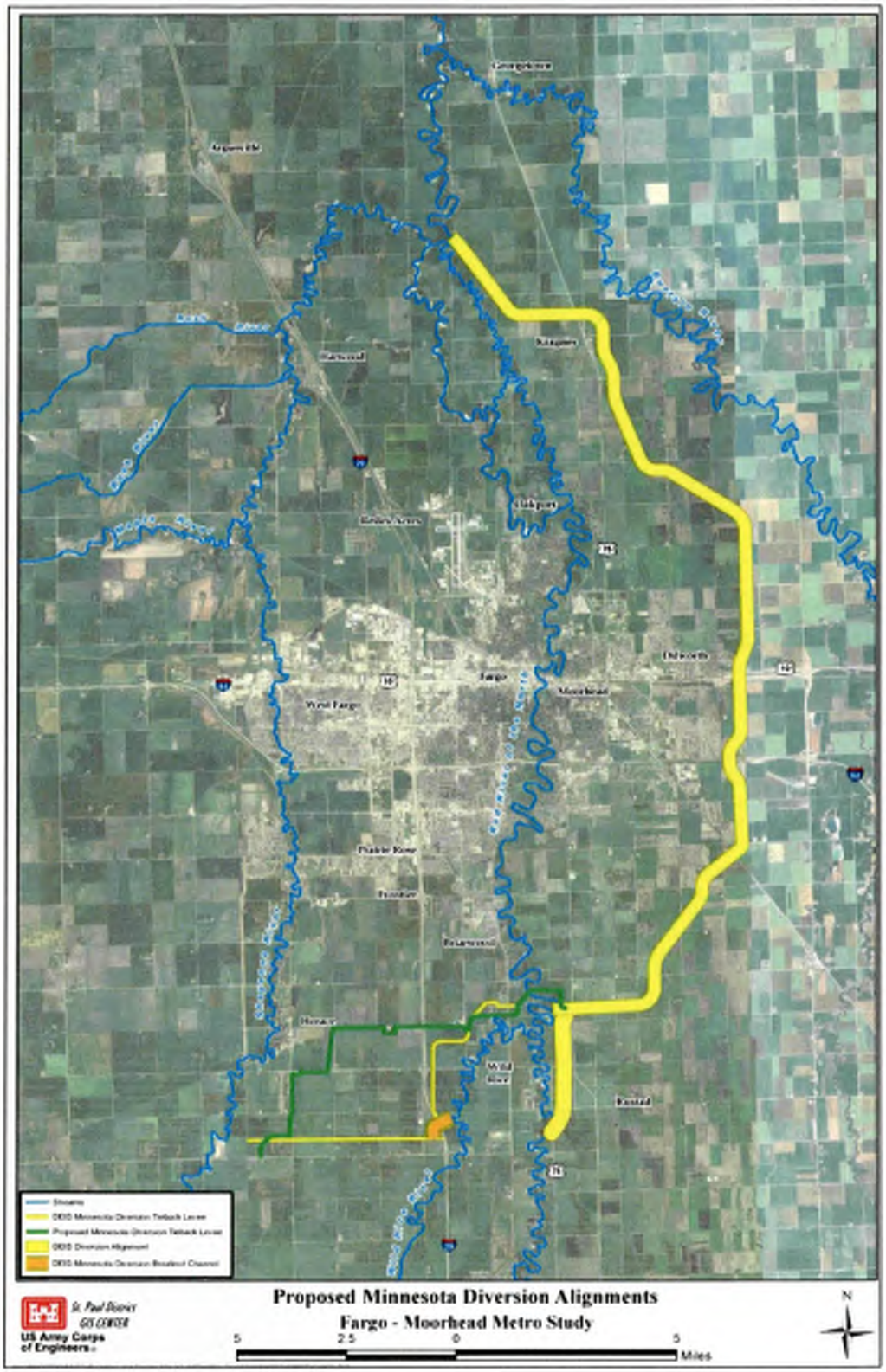


Figure 2. Proposed Minnesota Diversion alignments (Federally Comparable Plan).

**PROGRAMMATIC AGREEMENT
AMONG THE U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT,
THE NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER, AND
THE MINNESOTA STATE HISTORIC PRESERVATION OFFICER
REGARDING
THE FARGO-MOORHEAD METRO FLOOD RISK MANAGEMENT PROJECT,
CASS COUNTY, NORTH DAKOTA AND CLAY COUNTY, MINNESOTA**

AMENDMENT NO. 1

WHEREAS, the St. Paul District, U.S. Army Corps of Engineers (Corps) is continuing to evaluate and design flood risk management measures for the cities of Fargo, Cass County, North Dakota and Moorhead, Clay County, Minnesota; and

WHEREAS, a Programmatic Agreement between the Corps, the North Dakota State Historic Preservation Officer, and the Minnesota State Historic Preservation Officer, was executed on June and July 2011; and

WHEREAS, project features may include environmental mitigation areas and in-town (Fargo and Moorhead) levees, in addition to those previously addressed in the original Programmatic Agreement;

NOW THEREFORE, the parties agree to amend the Programmatic Agreement as follows:

Revise the 4th WHEREAS clause from:

WHEREAS, the Corps has established the Project's Area of Potential Effects (APE), as required by 36 CFR § 800.4(a)(1) and defined in section 800.16(d), as consisting of the footprint of the selected diversion plan including the diversion channel alignment, its associated tieback levee(s), associated construction work areas, construction staging areas, borrow areas, and disposal areas, as well as associated upstream water storage and water staging areas, project-related floodproofing locations, and the viewshed to one-half mile from the diversion channel's centerline, to one-eighth mile from the tieback levee's centerline, and to one-eighth mile outside the storage area boundary levee's centerline; and

To the following:

WHEREAS, the Corps has established the Project's Area of Potential Effects (APE), as required by 36 CFR § 800.4(a)(1) and defined in section 800.16(d), as consisting of the footprint of the selected diversion plan including the diversion channel alignment, its associated tieback levee(s), associated construction work areas, construction staging areas, borrow areas, and disposal areas, as well as associated upstream water storage and water staging areas, project-related floodproofing locations, project-related environmental mitigation areas, project-related in-town

(Fargo and Moorhead) levees, and the viewshed to one-half mile from the diversion channel's centerline and all other above-ground project features; and

Signature below indicates concurrence with the above proposed amendment to the original Programmatic Agreement.

ST. PAUL DISTRICT, U.S. ARMY CORPS OF ENGINEERS

BY: _____ DATE: 15 NOV 2012
COL Michael J. Price, District Engineer

NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICER

BY: _____ DATE: 11-20-12
Merlan E. Paaverud, Jr., State Historic Preservation Officer

MINNESOTA STATE HISTORIC PRESERVATION OFFICER

BY: Barbara Howard DATE: 12-04-2012
Barbara M. Howard, MN Deputy State Historic Preservation Officer

Concur:

CITY OF FARGO

BY: _____ DATE: 12-19-12
Dennis Walaker, Mayor

CITY OF MOORHEAD

BY: _____ DATE: 2-14-2013
Mark Voxland, Mayor

BY: _____ DATE: 2/13/13
Michael J. Redlinger, City Manager

Concur:

CASS COUNTY BOARD OF COMMISSIONERS

BY: Vern Bennett DATE: 1-7-2013

~~Ken Pawluk,~~ Chairman
Vern Bennett

CLAY COUNTY BOARD OF COMMISSIONERS

BY: W Ingersoll DATE: 2-15-13

~~Grant Weyland,~~ Chairman
Wayne Ingersoll

LEECH LAKE BAND OF OJIBWE

BY: Gina Lemon DATE: 5-15-13

Gina Lemon, Leech Lake Tribal Historic Preservation Officer

Post-Operation Private Lands Debris Clean-Up Plan

Introduction

Operation of the Project will result in the staging and retention of flood waters upstream of the Fargo-Moorhead metro area. The upstream retention of floodwaters will impact a different amount of acres for each flood event depending on the magnitude of the flood and a variety of other factors. The Diversion Authority will obtain flowage easements on the properties that are within a defined mitigation area. The flowage easement will compensate property owners for the impacts associated with the Project, but it places the responsibility for post-operation clean-up on the property owner. In recognition that operation of the upstream mitigation area may cause debris (logs, straw, trash, etc.) to accumulate within and along the edges of the upstream mitigation area, the Diversion Authority has developed the following post-operation debris clean-up plan.

Post-Operation Debris Clean-Up Plan

If the Project operates, the Diversion Authority will enact the following post-operation debris clean-up plan. The plan is specific to clean-up of debris in the upstream mitigation area from operation of the Project.

- The plan will pattern the "clean-up week" approach used throughout the metro area.
- The Diversion Authority will declare the Project operated.
- The Diversion Authority will define the boundary of the upstream mitigation area based on the actual flood event.
- The Diversion Authority will notify affected property owners in the area eligible via posting of a map on the Project website (www.fmdiversion.com) for clean-up assistance and provide direction on clean-up procedures.
- The Diversion Authority will solicit quotes from contractors for clean-up of flood debris in the upstream mitigation area.
- Upon receipt of quotes, the Diversion Authority will retain one or more contractors to conduct the flood debris clean-up operations in the upstream mitigation area.
- Property owners will be responsible for moving debris to established field entrances or access points that the contractors can access without impacting farm operations.
- Contractors will only enter upon established field entrances or access points to pick up the debris.
- Eligible debris for pick-up will be limited to debris caused by the flood event.
- The contractors will be responsible for ultimate disposal of the debris.

Post-Operation Public Lands Repair and Clean-Up Plan

Introduction

Operation of the Project will result in the staging and retention of flood waters upstream of the Fargo-Moorhead metro area. The upstream retention of flood waters will impact a different amount of acres for each flood event depending on the magnitude of the flood and a variety of other factors. There are a variety of "public lands" in the upstream mitigation area such as township and county roads, drainage ditches, cemeteries, and parks. In recognition that operation of the upstream retention area may cause some damage to these public lands as well as the accumulation of debris (logs, straw, trash, etc.), the Diversion Authority has developed the following post-operation public lands repair and clean-up plan.

Post-Operation Public Lands Repair and Clean-Up Plan

If the Project operates, the Diversion Authority will enact the following post-operation public lands repair and clean-up plan. The plan is specific to repair and clean-up of public lands in the upstream mitigation area from operation of the Project. Public lands include township and county roads, drainage ditches, cemeteries, and parks. This plan will allow local government entities (townships, water boards, etc.) to contract for the repair and clean-up work on the public lands, and then submit for reimbursement to the Diversion Authority. This plan allows the local government entities the ability to contract for the work as they prefer.

- The plan will pattern the approach the FEMA uses for post-disaster damage assessment and reimbursements.
- The Diversion Authority will declare the Project operated.
- The Diversion Authority will define the boundary of the upstream mitigation area based on the actual flood event.
- The Diversion Authority will notify public entities of eligible areas and request that the public entity identify any damage that may have been caused by the Project operation, including debris removal.
- The Diversion Authority will send a representative to meet with the public entities to verify damage on a site by site basis.
- The public entities shall solicit quotes (in conformance with procurement, legal, and regulatory requirements) for the repairs or clean-up work at each site, and submit the quotes for each site to the Diversion Authority for review.
- The Diversion Authority shall review the quotes for reasonableness, and either approve, request additional details, or deny the quote.
- The Diversion Authority will confirm the work was completed in accordance with the quote, and then reimburse the public entity.
- The Diversion Authority will also consider reimbursement of emergency repairs that may be needed in advance of following this process.

Summer Operation Supplemental Crop Loss Program

Introduction

The Project requires the temporary and occasional retention of flood waters immediately upstream of the southern embankment of the Project. The Diversion Authority will provide mitigation for properties in the upstream mitigation area, and the mitigation has generally been considered to be the acquisition of a permanent flowage easement and associated payment to the property owners, which is required by USACE. Generally, the permanent easement would restrict construction of structures/buildings, but it would allow the land to continue to be used for agriculture production including growing crops, livestock, and hay production.

The flowage easement is intended to provide compensation for impacts associated with the Project and is expected to be a one-time payment at the time the easement is purchased. Under this plan, the one-time payment for the flowage easement would compensate the land-owner for impacts associated with delayed planting, prevented planting, debris, loss of development rights, etc.

The Diversion Authority recognizes the impact to the agricultural community on both the North Dakota and Minnesota side of the Red River and has studied and considered supplemental mitigation solutions, which are greater than what has historically been provided to property owners. In recognition of: (a) the importance of the farm economy to the region; (b) that summer operation would damage growing crops; (c) and that summer operation of the Project is extremely unlikely, the Diversion Authority will adopt a Summer Operation Supplemental Crop Loss Program to provide additional assurance to producers in the upstream mitigation area. The Program would provide producers coverage for the risk associated with Project induced flooding on growing crops during the unlikely summer operation of the Project. The Diversion Authority understands and acknowledges that this program is important to the agricultural community because under these events, it is believed that producers may not be able to utilize the federal crop insurance program(s) for crop damages directly caused by operation of the Project. This program will be available for producers in the upstream mitigation area, which is defined as the area below the elevation of the spillway, which is expected to be 923.5 feet (NAV88). This is the same area where the Diversion Authority will obtain flowage easements.

Proposed Summer Operation Supplemental Crop Loss Program

The Diversion Authority, with the assistance of its insurance advisory, AON, has studied the cost of purchasing a private insurance product, and found that the premiums for the summer flood events may be cost prohibitive. As such, the Diversion Authority will create a self-funded insurance reserve fund for the Summer Operation Supplemental Crop Loss Program. The Program will compensate producers in the upstream mitigation area for crop losses directly caused by operation of the Project during the normal crop growing season.

Given the complexity associated with reviewing and administering crop loss claims, the Diversion Authority will seek the assistance from a neutral and independent third party to administer damage

claims associated with summer operation of the Project and to determine whether payments should be made from the Program. The Diversion Authority intends to coordinate with existing state agencies to determine if the state(s) could assist as the neutral and independent third party in administering any damage claims. The Diversion Authority will be developing additional information regarding the Program within the next 12 to 24 months. The Diversion Authority would be responsible to make timely payment claims based on the adjustment decisions of the third party agent.

Though there has never been a summer flood event in recorded history that would have triggered the operation of the Project, it is possible that an event could happen. If such a major rain event occurs during the normal growing season, and if the rain is significant enough to cause the Project to operate, flooding will occur on farmlands due to the rain event. It is envisioned that a producer could then submit a damage claim and then the claims adjuster would evaluate the claim to determine liability, if any for the damages. If the claims administrator and adjuster find the Project is liable, then the Diversion Authority would make the payment to the producer from its self-funded reserve fund.

To be eligible for the program, a producer must participate in a federal crop insurance program, have growing crops within the upstream mitigation area, and have notified the Diversion Authority of his/her intent to participate in the Summer Operation Supplemental Crop Loss Program. It is the Diversion Authority's understanding that agricultural producers obtain various rates of coverage through federal crop insurance program. Some are insured for 65 percent, others insure for upwards of 80 percent based upon the year and type of crop grown. The Diversion Authority's Program would provide 90 percent coverage for all crop damages directly caused by summer operation of the Project, regardless of year or crop grown.

Additional Background:

- The FM Diversion Project includes an upstream mitigation area for staging of flood waters as a necessary feature of the Project.
- USACE has defined a portion of the upstream staging as an "operating pool". This area is necessary to offset the downstream impacts that would exist without upstream mitigation, and the operating pool is based on areas with impacts greater than 1-foot (generally).
- The upstream impacts extend beyond the "operating pool" for a total area of approximately 40,000 acres.
- The NDSWC and MDNR have suggested using the top elevation of the Limited Service Spillway, or the maximum pool elevation, which are both expected to be 923.5-feet, to define the area of mitigation.
- Mitigation is generally considered acquisition of a flowage easement and associated payment to the property owner, as USACE has mandated that the Diversion Authority obtain a flowage easement for areas within the operating pool.
- The flowage easement will cover impacts associated with the Project, and is expected to be a one-time payment at the time the easement is secured. Under this plan, the flowage easement would cover impacts associated with delayed planting, loss of development rights, etc.

- The Diversion Authority has considered additional mitigation solutions such as Summer Operation Supplemental Crop Loss Program. One of the primary considerations of additional farm mitigation is to help ensure producers are covered for the risk of Project induced summer flooding on growing crops. Under these events, producers may not be able to tap into federal crop insurance.
- Based on insured values and crop types in 2014, along with the size of the upstream mitigation area, the total estimated maximum loss for all crops in the operating pool is approx. $20-25M. (Note that the value of agricultural commodities has decline significantly from 2014 levels. In some cases, the price of commodities have declined by up to forty percent (40%).)
- The Diversion Authority will self-fund the program. The Diversion Authority has the financial strength to sustain a self-funded insurance reserve fund in order to assume the risk of this type of event, given that the probability of events that would cause summer operation are extremely low, and given the O&M Funding Program that will be established.
- If this Program is utilized, the Diversion Authority would utilize an O&M Funding Program to fund/finance the costs associated the Summer Operation Supplemental Crop Loss Program payments.

Financial Assurance Plan for O&M and On-Going Mitigation

Introduction

The Project will require the Diversion Authority to providing funding for long term operation and maintenance (O&M) costs. In addition to defining the financial plan for construction of the Project, it is important to develop a financial plan for on-going O&M of the Project, including funding for the various mitigation efforts that will be required well into the future. The Diversion Authority will establish an on-going O&M Funding Program and utilize either sales taxes or a maintenance district, or a combination of both to fund the costs. In addition, the Diversion Authority will make sure that all of the mitigation costs outlined in the Mitigation Plan will be eligible for funding through the O&M Funding Program. The O&M Funding Program will also provide a mechanism for funding unforeseen mitigation needs that may arise due to Project operation. The Project will follow an Adaptive Management and Monitoring Plan (AMMP) to monitor performance of environmental mitigation projects along with environmental changes after Project operation events, and the O&M Funding Program will fund additional required mitigation as determined through the AMMP.

O&M Funding Program

Pursuant to the Joint Powers Agreement (the "JPA"), which created the Diversion Authority, the O&M of the Project, including the O&M of transportation elements of the Project, will be financed from a variety of revenue sources. The first source of revenue for O&M costs will be excess sales and use taxes. If any excess revenues of the County 2010-2 Sales Tax, [11] the City Flood Control Tax, the City Infrastructure Tax[12],

[11] Pursuant to Ordinance No. 2010-2, Cass County imposed a one-half of one percent (0.5%) sales and use tax upon the gross receipts of retailers from all sales at retail, including leasing or rental of tangible personal property, within the corporate limits of Cass County ("County 2010-2 Sales Tax"). The proceeds of the County 2010-2 Sales Tax are dedicated for payment of expenses incurred for the planning, engineering, land purchase, construction, and maintenance of a Red River diversion channel and other flood control measures or the payment of special assessments, or debt incurred for a Red River diversion and other flood control measures as authorized by the Board of Cass County Commissioners. Cass County has determined that it will legally pledge not less than ninety-one percent (91%) of the County 2010-2 Sales Tax to sales and use tax revenue bonds issued by Cass County (the "County Sales Tax Bonds") and will dedicate (but not legally pledge) sales and use tax revenues not required for annual debt service or to replenish reasonably required debt service reserve funds on the County Sales Tax Bonds to the payment of debt service for improvement bonds issued by CCJWRD, and Milestone, Availability, and P3 Payments for the Project. The County 2010-2 Sales Tax was anticipated to expire on March 31, 2031. The Cass County Commission, however, desired to extend the expiration date for the County 2010-2 Sales Tax until 2084, and voted unanimously to place such extension upon the November 8, 2016, ballot. (The County 2010-2 Sales Tax was previously approved by sixty-four percent (64%) of the voters.) On November 8, 2016, the extension of the County 2010-2 Sales Tax was approved by sixty-three percent (63%) of the voters (in both elections, a simple majority of voters was needed in order to pass). Pursuant to the ballot question presented to the voters, sales and use tax revenue generated by the Cass County 2010-2 Sales Tax may be used for Debt Obligations, Milestone Payments, Availability Payments, and any other costs or charges associated with the DCAI and Comprehensive Project.

[12] The City of Fargo has adopted a sales and use tax ("City Flood Control Tax") by enacting Article 3-21 of the City of Fargo Municipal Code. The City Flood Control Tax imposes a one-half of one percent (0.5%) sales and use tax upon the gross receipts of retailers from all retail sales, including the leasing or renting of tangible personal property, within the corporate limits of the City of Fargo. The proceeds of the City Flood Control Tax are dedicated for acquiring

or any Additional Sales and Use Tax remain after the payment of debt obligations issued for the capital costs of the project, these revenues may be used for operations and maintenance of the Project.

The second source of revenue will be maintenance levy from FM Flood Risk Management District No. 1. It is anticipated that O&M for the Diversion Channel and Associated Infrastructure (DCAI) will be performed by the successful P3 contract/proposer; O&M of the Southern Embankment and Associated Infrastructure (SEAI) will be performed by the Diversion Authority and/or its Member Entities. When the Cass County Joint Water Resource District (CCJWRD) a member entity of the Diversion Authority created the FM Flood Risk Management District No. 1 under North Dakota law, the CCJWRD also created a

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property; making, installing, designing, financing, and constructing improvements; engaging in projects that are necessary for the goal of achieving risk reduction and the ability to defend the community against a five hundred (500) year flood event; and servicing bonds or other debt instruments. The City of Fargo has determined that it will dedicate one-hundred percent (100%) of its City Flood Control Tax to sales and use tax revenue bonds issued by City of Fargo (the "City Sales Tax Bonds") and will dedicate (but not legally pledge) sales and use tax revenues not required for annual debt service or to replenish reasonably required debt service reserve funds on the City Sales Tax Bonds to the payment of debt service and Milestone, Availability, and P3 Payments for the Project.

In 2012, the City of Fargo adopted a second sales and use tax ("City Infrastructure Tax") by enacting Article 3-22 of the City of Fargo Municipal Code. The City Infrastructure Tax imposes a one-half of one percent (0.5%) sales and use tax upon the gross receipts of retailers from all retail sales, including the leasing or renting of tangible personal property, within the corporate limits of the City of Fargo. The proceeds of the City Infrastructure Tax are dedicated for such infrastructure capital improvements as the governing body of the City of Fargo selects, including streets and traffic management; water supply and treatment needs including construction or expansion of water treatment facilities; water distribution system needs; sewerage treatment and collection system needs, including construction or expansion of sewage treatment facilities; and flood protection or flood risk mitigation projects, and related improvements and activities. The City of Fargo has determined that it will legally dedicate (but not legally pledge) one-hundred percent (100%) of its City Infrastructure Tax not being utilized for present infrastructure projects toward payment of Debt Obligations and Milestone, Availability, and P3 Payments for the Project.

The City Flood Control Tax and the City Infrastructure Tax were anticipated to expire on December 31, 2029, and December 31, 2032, respectively. The City of Fargo City Commission, however, desired to extend the expiration dates for the City Flood Control Tax and the City Infrastructure Tax until 2084, and as a result, voted to place such extensions upon the November 8, 2016, ballot. The City Flood Control Tax was previously approved by ninety and seven/tenths percent (90.7%) of the vote, and the City Infrastructure Tax was previously approved by sixty and three/tenths percent (60.3%) of the vote. On November 8, 2016, the extension of the City Flood Control Tax and the City Infrastructure Tax was approved by sixty-six percent (66%) of the voters (a super majority, i.e. sixty percent (60%), was needed to pass). Pursuant to the ballot question presented to the voters, sales and use tax revenue generated by the City Flood Control Tax and the City Infrastructure Tax may only be used for Debt Obligations, Milestone Payments, Availability Payments, and any and all other costs or charges associated with the Project.

The City of Fargo has additionally imposed a sales and use tax ("City Capital Improvements Tax") by enacting Article 3-20 of the City of Fargo Municipal Code. The City Capital Improvements Tax imposes a one percent (1%) sales and use tax upon the gross receipts of retailers from all retail sales, including the leasing or renting of tangible personal property, within the corporate limits of the City of Fargo. The proceeds of the City Capital Improvements Tax are also dedicated for such infrastructure capital improvements as the governing body of the City of Fargo selects, including streets and traffic management; water supply and treatment needs including construction or expansion of water treatment facilities; water distribution system needs; sewage treatment and collection system needs, including construction or expansion of sewage treatment facilities; and flood protection or flood risk mitigation projects. The City of Fargo will dedicate one quarter of the one percent (0.25%) City Capital Improvement Tax toward payment of Debt Obligations and Milestone, Availability, and P3 Payments for the Comprehensive Project until 2028.

maintenance district. The maintenance district includes the same properties and benefits as are included in the FM Flood Risk Management District No. 1, and the CCJWRD can levy special assessments within the district for maintenance costs (the "Maintenance Levy"). Under North Dakota law, the determination of how much property may be assessed for a Maintenance Levy is based upon the value of the property deemed to be benefitted by the project. Specifically, the Maintenance Levy assessment may not exceed four dollars ($4.00) per acre annually for agricultural lands and two dollars ($2.00) annually for each five hundred dollars ($500) of taxable valuation[13] of non-agricultural property.[14] Currently, within FM Flood Risk Management District No. 1 the total taxable valuation of non-agricultural property is fourteen billion one hundred ninety-two million seven hundred twelve thousand thirty dollars ($14,192,712,030). With respect to the FM Flood Risk Management District No. 1, the property benefitted will include developed property within the cities of Fargo, West Fargo, Reile's Acres, Harwood, Horace, and Frontier, North Dakota. As a result, FM Flood Risk Management District No. 1 has sufficient capacity to provide funds for O&M of the Project.[15]

The third source of revenue will be a Storm Water Maintenance Fee[16] levied and collected monthly by the City of Moorhead, Minnesota. Pursuant to the JPA, the City of Moorhead has agreed to levy and collect and remit a portion of its storm water maintenance fee for the O&M of the Project.

[13] By way of example, a non-agricultural property having a taxable value of $200,000 would receive an annual maintenance assessment of $800 each year. ($200,000 ÷ $500 = 400 x $2.00 = $800.)

[14] Another method for determining the assessment amount for urban parcels is a weighted method based on benefit, in proportion to agricultural land benefit.

[15] North Dakota law limits a water resource district to only accumulate a maximum reserve fund of an amount not exceeding the total sum provided by the maximum permissible levy; however, until such sum is reached, a district may continue to levy the annual maintenance levy, and the maintenance levy may remain in place as long as is needed. See N.D.C.C. § 61-16.1-45.

[16] Pursuant to the JPA, the Minnesota Member Entities are responsible for two percent (2%) of the comprehensive maintenance costs. The City of Moorhead's current Storm Water Maintenance Fee generates approximately $2.5 million (in 2016 dollars) per year.

Mitigation Communication Plan

Introduction

The Project is a massive civil works project that has a tremendous amount of public interest. This has been the case since federal studies began in 2008. Public interest is expected to continue through construction and beyond as the Project is operational – both for protection of the metro area, and for proper planning and notification of impacts to the upstream mitigation area. Communications during construction and operation will remain an important long-term goal of the Diversion Authority, and any other entity responsible for operation and maintenance of the Project.

Existing Communication Structures

To date, the primary means of communication with the general public has been through regular contact with staff at the government entities that make up the Diversion Authority and through the Project website www.fmdiversion.com. In addition, traditional local media has covered the Project during various Project milestones. Tools including fact sheets, newsletters, social media, news conferences, and videos have also been used.

It is likely that the governmental entities that make up the Diversion Authority will remain the key front-line communicators of the Project during maintenance and recreation, and during times of flooding and operations.

The Diversion Authority is also committed to the long-term existence of www.fmdiversion.com as a primary communication method with the general public. The website allows for universal access regardless of location or time. From time to time, the Diversion Authority may review the use of the Project website to determine if communication needs to expand beyond the technology in use. For example, currently the Diversion Authority utilizes a Twitter account and newsletter to keep the public abreast of the latest news and progress. These continue to be useful tools but may be augmented in the future if new technology presents more useful tools that better achieve communication goals.

Working with traditional media sources will continue, but it will likely evolve with technological advancements as well. During times of flood, traditional communication channels in which the public is comfortable are critical in getting timely information disseminated.

Future Project-Specific Communication Methods

With the completion of the Project, there will be significant ongoing maintenance and operational specifics every year. In times of extreme flooding, communication efforts become especially important for safety, agricultural planning, timely burials, and other land management concerns of those in the upstream mitigation area.

Property owners within the upstream mitigation area will be given timely notification of impending operation of the Project to ensure proper management of their properties. This notification will occur before the Project operates with as much notice as the emergency level of the situation allows.

In addition to communications regarding operation of the Project, there will be a recurring need to notify and remind property owners with flowage easements attached to their property. The Diversion Authority will utilize the Project website to host an interactive web-based GIS map tool, as well as maps indicating the upstream mitigation area in which flowage easements are in place. The maps on the Project website will serve as a reminder for property owners to make sure they remain aware of existing flowage easements and the obligations of the property owner and the Diversion Authority under the terms of the flowage easement. In addition, it should be noted that the Diversion Authority will also record those flowage easements with the County Records office to ensure they are available for legal purposes at all times.

Oxbow Hickson Bakke Mitigation Project

Summary

The Project includes an upstream mitigation area for temporarily and occasionally storing flood waters. The upstream mitigation area would require acquisition and relocation of the City of Oxbow, Hickson, and Bakke if a ring levee was not constructed to protect those communities and mitigate the impacts from the Project. The Oxbow, Hickson, Bakke (OHB) Ring Levee Project was developed as a mitigation solution in 2013 as a means to mitigate existing, natural, and induced flooding. The OHB Ring Levee Project was incorporated into the Supplemental Environmental Assessment prepared by USACE in September 2013.

The OHB Ring Levee Project includes:

- Construction of a ring levee around the three communities.
- Internal drainage improvements.
- Acquisition and relocation of 40 residences, the golf course clubhouse, several golf holes, and farmland to make way for the levee.
- Construction of new residential lots for relocation of displaced Oxbow residences, and relocation of displaced upstream mitigation area residences.

Upon completion, the Cass County Joint Water Resource District (CCJWRD) will own and maintain the OHB Ring Levee, in coordination with the City of Oxbow and the Diversion Authority.

Supplemental EA Appendix C

Appendix C from the Supplemental Environmental Assessment provides a summary and background, identification of alternatives, and description of the selected OHB ring levee alternative. The report is attached to this Mitigation Plan for convenience.

Additional Details

Additional details regarding the OHB Ring Levee can be found in a Technical Memorandum dated March 12, 2013. The Technical Memorandum can be found online at:
http://www.fmdiversion.com/pdf/CorpsEA/References/OHB%20Ring%20Levee/TM_OHB_20120312.pdf

US Army Corps of Engineers®
St. Paul District

Oxbow/Hickson/Bakke Ring Levee
Appendix C

Fargo Moorhead Metropolitan Area
Flood Risk Management Project

EA Document

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Oxbow/Hickson/Bakke Ring Levee
Appendix C

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Appendix C

1 INTRODUCTION

1.1 Summary

Operation of the Fargo Moorhead Metropolitan Area Flood Risk Management Project (Project) would result in flood water being staged upstream of the cities of Fargo and Moorhead, including around the city of Oxbow, the village of Hickson, and the Bakke subdivision. The Final Feasibility Report and Environmental Impact Statement (FEIS) included acquiring all structures in fee in the Oxbow, Hickson, and Bakke area. The United States Army Corps of Engineers (Corps), at the request of the non-Federal sponsors, has determined that constructing a ring levee around the Oxbow, Hickson, and Bakke area is a viable alternative to a total fee acquisition. The ring levee around the Oxbow, Hickson, and Bakke area is the alternative recommended by the non-Federal sponsors. The cost to construct the proposed levee and associated features is estimated to be approximately $65 million. The cost for a fee acquisition of all three communities, as presented in the FEIS, is estimated to cost approximately $74 million.

1.2 Background

In the FEIS, the communities of Oxbow, Hickson, and Bakke are identified as being located within the Staging Area. During development of the FEIS, the city of Oxbow asked that either all residential structures be benefited by the construction of a permanent ring levee, or the entire community be acquired in fee. Through analysis during the feasibility phase it was determined that all residential structures could not be benefited. Due to their proximity to the riverbank and geotechnical stability issues, several homes would need to be removed to construct a ring levee to benefit the remainder of the communities. After the determination that all residential structures could not be benefited with a ring levee, it was recommended that the community be acquired in fee.

After the FEIS was completed, the non-Federal sponsors asked the Corps to analyze a ring levee option to benefit the three communities, with the understanding that several homes would need to be removed, but could be replaced on a one-for-one basis within the ring levee benefitted area.

1.3 Development of Alternative Alignments

An alignment was developed and is shown in Figure 1. This conceptual alignment was presented to the communities and general public at a meeting on January 8, 2013 in Fargo, North Dakota. Individual meetings were also held for residents of Oxbow, Hickson, and Bakke after the public meeting and the following two days in Hickson, North Dakota. The meetings were held to provide information on the proposed ring levee concept, to meet with impacted residents, and to address concerns about the

proposed ring levee. Residents impacted by the ring levee were invited, via letter, to attend the public meeting and to sign up for a one-to-one meeting.

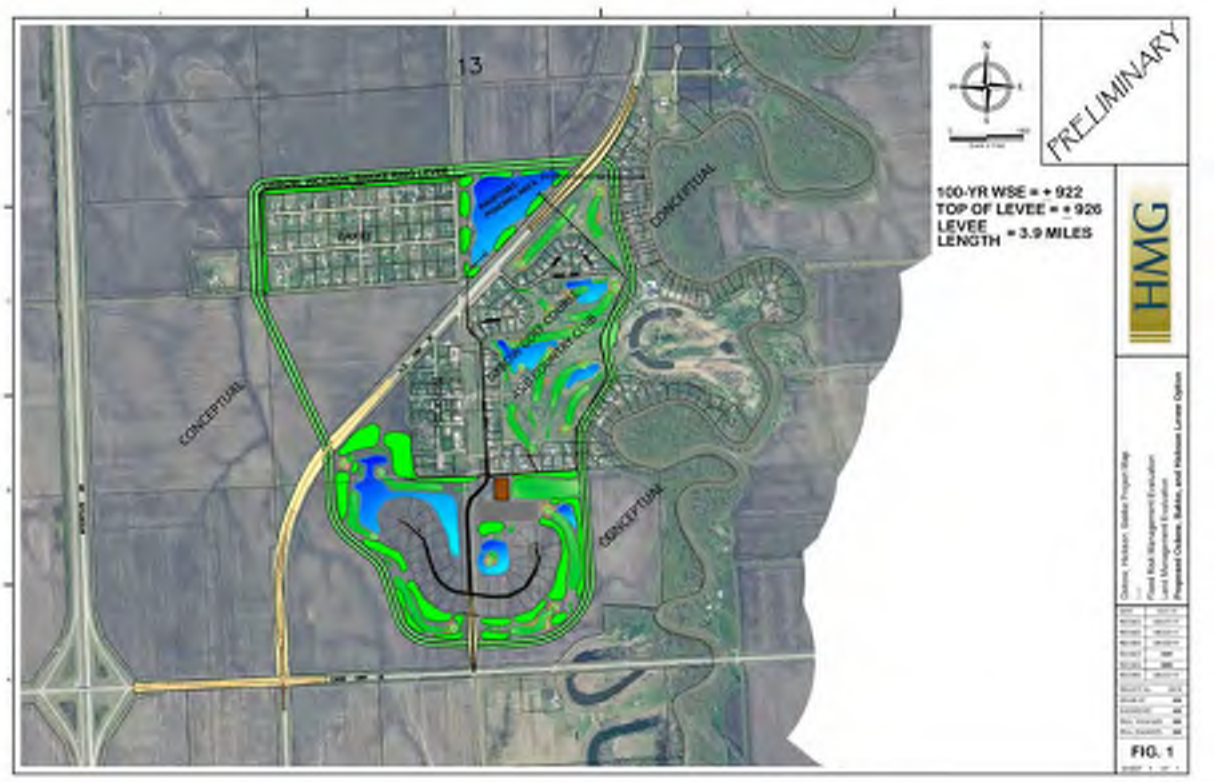


Figure 1 Ring Levee Alignment

Over 150 people attended the public meeting and 76 individual meetings were held in person or over the phone. An anonymous, informal survey was also provided to residents to gain additional information from impacted residents. The survey results indicate that many residents of Oxbow support the ring levee concept, while many Bakke and Hickson residents do not support the ring levee concept.

On January 23, 2013, the city of Oxbow City Council carried a motion to remove from the record a previous resolution as it related to any opposition against the Project. In addition, it also carried a motion to rescind a previous resolution which supported the Richland Wilkin JPA (Joint-Powers Agreement) formed to oppose the Project. On January 10, 2013, Pleasant Township passed a Resolution of Opposition to Fargo-Moorhead Metropolitan Area Flood Risk Management Project. The resolution is in opposition of the diversion project as well as the proposed ring levee for the communities of Oxbow, Hickson, and Bakke.

Because of the varying support and opposition to the ring levee concept, two additional alternatives were developed. The additional alternative alignments are as follows: ring levee for Oxbow and Hickson with a fee acquisition for Bakke residents; ring levee for Oxbow only with fee acquisitions for Hickson and Bakke residents. All three alternative alignments are shown in Figure 2.

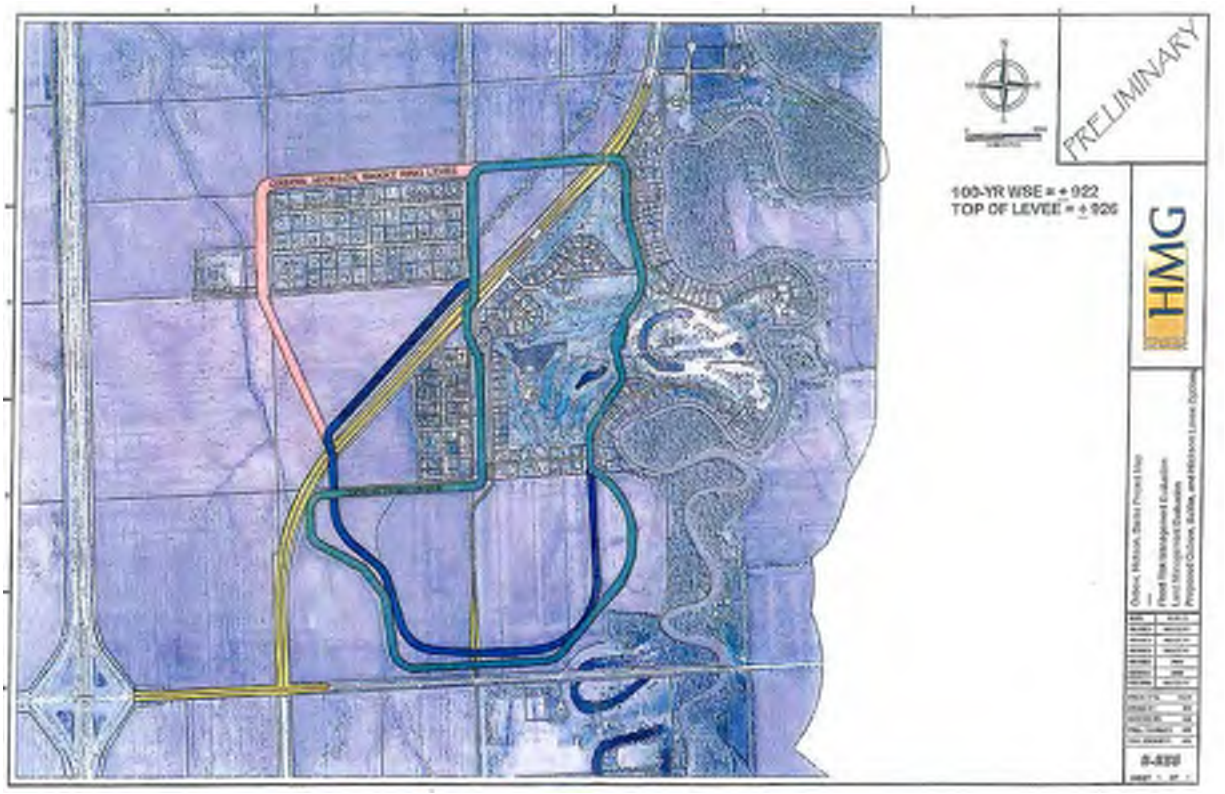


Figure 2 Alternative Alignments

1.4 Comparison of Alternative Alignments

Each alternative alignment would provide benefits up to the 0.2-percent chance (500-year) event. The full Oxbow, Hickson, and Bakke alignment would cost approximately $65 million and benefit 196 properties. The Oxbow/Hickson ring levee alternative would cost approximately $85 million and benefit 139 properties and the Oxbow-only ring levee alternative would cost approximately $90 million and benefit 106 properties. All alignments would maintain the Oxbow Country Club.

The full alignment would benefit the church, community center, and businesses in Hickson and Oxbow. The full alignment would maintain this area's tax base for the Kindred School District, while the Oxbow/Hickson alternative alignment would reduce the tax base by $21 million and the Oxbow-only alternative alignment would reduce the tax base by $26 million.

Table 1 provides additional information on the costs and other information related to each levee alignment.

Table 1 Oxbow, Hickson, and Bakke Area Levee Alternatives

Options	Technically Feasible	Properties Protected	Cost					Community Preference
			Total	Buyout (Staging)	Buyout (Alignment)	Design	Construction	
100% Buyout	Yes	0	**$74M** (all 2018+)	$74M	$0	$0	$0	O: No B: Yes H: TBD
Full OHB Levee	Yes	196	**$65M** (all 2013/15)	$0	$24M	$5M	$36M	O: Yes B: No H: TBD
OH only Levee	Yes	139	**$85M** ($64M-2013/15; 21M-2018+)	$21M	$24M	$5M	$35M	O: Yes B: Yes H: TBD
Oxbow only Levee	Yes	106	**$90M** ($64M-2013/15; 26M-2018+)	$26M	$24M	$5M	$35M	O: Yes B: Yes H: TBD

1.5 Recommendation of Proposed Alternative by the non-Federal Sponsors

The non-Federal sponsors recommended that the Corps consider the full Oxbow, Hickson, and Bakke alignment because it benefits the most properties and is the lowest in cost.

2 PROPOSED ALTERNATIVE

The full Oxbow, Hickson, and Bakke ring levee would be designed to provide flood risk management for the Oxbow, Hickson, and Bakke area, transportation improvements intended to maintain access to the communities, and infrastructure to replace public and private infrastructure affected by the construction of the ring levee. The alignment for the proposed alternative is a conceptual alignment that may be modified during detailed design studies; any changes in alignment will be evaluated for changes to impacts from what is being discussed in this EA. It is not anticipated at this time that there would be an appreciable change in scope or magnitude to impacts. The attached technical memorandum, entitled "Oxbow, Hickson, Bakke Ring Levee", outlines a feasibility level design and cost estimate for constructing a ring levee for the Oxbow, Hickson, and Bakke area.

The full Oxbow, Hickson, and Bakke ring levee, shown in Figure 3, surrounds Hickson, Bakke, and a portion of Oxbow. Oxbow is located along the banks of the Red River of the North and generally

consists of residential lots surrounding the Oxbow Country Club. A number of residential lots as well as the country club would be impacted by the levee alignment. The alignment would generally parallel the Red River through residential areas in both the north and south portions of Oxbow and would cross directly through the Oxbow Country Club. The alignment would parallel the north edge of Bakke and southward along the west edge of Bakke and Hickson. From the southeast edge of Oxbow and the southwest edge of Hickson, the levee would encompass a previously agricultural area and surround new residential lots and golf holes. The new residential lots and golf holes would be constructed to mitigate those lost due to the construction of the levee. Where it would be adjacent to existing residential lots, the embankment would be located a sufficient distance from the edge of residential lots to allow for clear space needed for levee maintenance, drainage features, and a vegetative buffer. The levee would be located a sufficient distance from the Red River to ensure geotechnical stability.

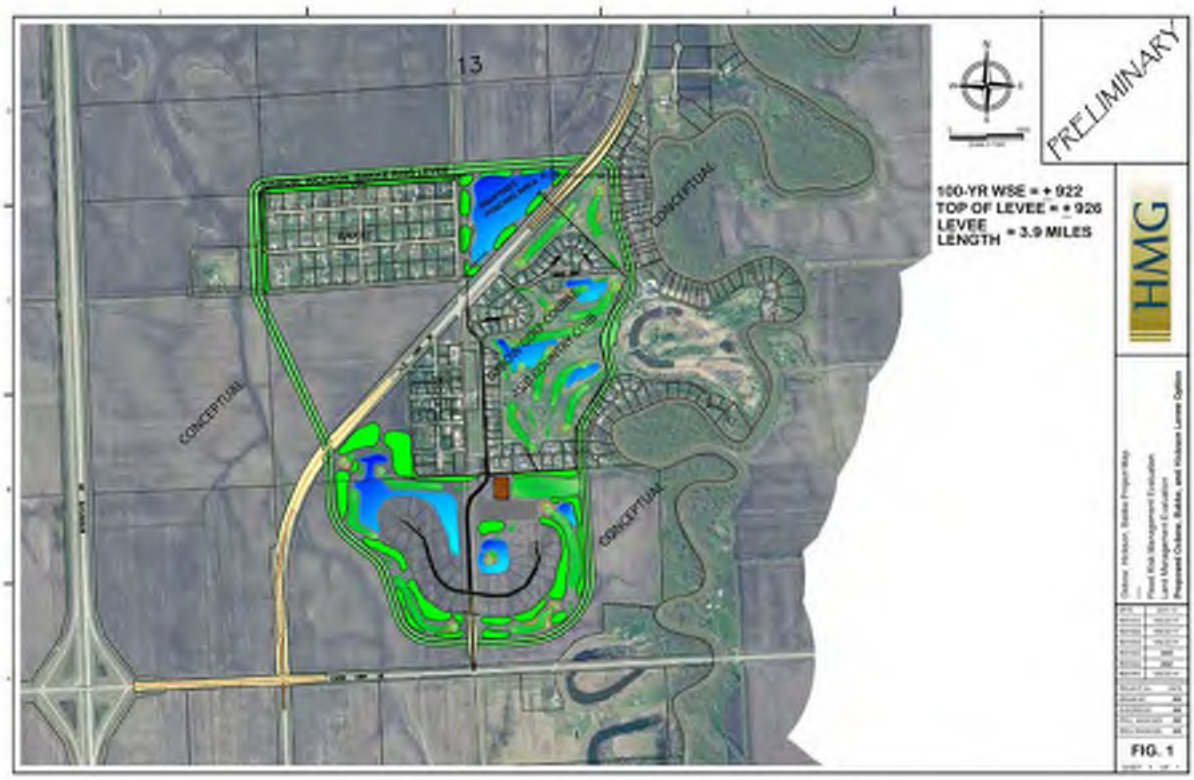


Figure 3 Proposed Alternative Full Oxbow/Hickson/Bakke Alignment

2.1 Impacts to Roads and Highways

Cass County Highway 81 would need to be reconstructed in two places. Two of the reconstructed areas are where the highway intersects the proposed Oxbow, Hickson, and Bakke ring levee. Both the north and south intersections would need to be gradually raised to maintain a safe line of sight for travel and meet the minimum height requirement for the proposed levee. The raise would extend through the intersection with Highway 18 to allow residents to access their homes in a time of flood. South of Cass County Highway 18, Highway 81 will gradually slope until it ties into the existing road grade.

Cass County Highway 18 between Cass County Highway 81 and Interstate 29 would also be raised. Raising the road would allow the residents of the Oxbow, Hickson, and Bakke communities to access their homes and business during events up to a 0.2-percent chance (500-year) event.

Cass County Highway 25 would be raised where it intersects the proposed Oxbow, Hickson, and Bakke ring levee on the south side of the communities. The change in road grade would begin at the intersection of Cass County Highways 25 and 18 until it reaches its maximum elevation height as it crosses the proposed ring levee, and it would then be graded back until it meets the existing roadway elevations.

2.2 Impacts to Local Structures

The construction of the ring levee would result in the removal of approximately 40 homes as well as disruptions to the Oxbow Country Club including several golf holes and the club house. The ring levee plan includes replacement of lost infrastructure, including residential lots and associated infrastructure and reconfiguration of the Oxbow Country Club. Replacement infrastructure described here is conceptual and would be subject to modifications through consultation with the city of Oxbow and the Oxbow Country Club during final design. The plan included here is intended to produce an overall footprint and cost estimate for the purpose of determining impacts of the proposed action. The following sections include a more detailed description of infrastructure replaced as part of the ring levee plan.

The proposed Oxbow, Hickson, and Bakke ring levee would require alteration of some of the infrastructure of the benefited communities. Most of the alterations would occur in the city of Oxbow, where a significant portion of the existing infrastructure is located under the proposed alignment or outside of the benefited area. To mitigate for the loss of infrastructure, an Oxbow addition is proposed. The Oxbow addition would include additional residential lots and new holes for the golf course and country club. The proposed Oxbow addition, as conceptualized, would extend the existing Sunset Drive south and shift the alignment along Cass County Highway 25, where it would cross the ring levee at a minimum elevation of 926 feet to meet levee height requirements and tie into Cass County Highway 25. The proposed road would include one intersection that services two cul-de-sacs, where the proposed residential lots would be located for the Oxbow addition. In addition to residential lots, the Oxbow Country Club would be relocated along Sunset Drive to allow for easy access to the clubhouse from either Cass County Highway 81 or Cass County Highway 18. Proposed roadways in the Oxbow addition would be paved. The proposed layout is a concept and may be altered in the future based on input from the local communities, the country club, the golf course architect, and other local authorities.

The existing sanitary sewer system serving the Oxbow Drive and Oxbow Circle area generally flows west to east to a lift station located outside of the ring levee area. This lift station would be abandoned and removed. A new lift station located near Oxbow Drive within the benefited area of the levee would be constructed to maintain sewer service to that portion of the City. The proposed Oxbow addition would require a new sanitary system that ties into an existing sanitary pipe network system located near the intersection of Sunset Drive and Riverbend Road. The system would be gravity fed into the existing system.

The existing water main for the city of Oxbow has a connecting loop that would be located on the un-benefited side of the levee. To maintain the loop, a pipe running parallel to the levee along the golf course that ties the water lines at Riverbend Road and Oxbow Drive together is included. The proposed Oxbow addition would tie into the existing water main located near the intersection of Sunset Drive and Riverbend Road.

The existing storm system generally slopes from west to east and ultimately outfalls into the Red River. To reduce the number of pipes crossing the levee, two separate pipe network systems are proposed, one that utilizes the existing storm pipe network and one that would be for the proposed Oxbow addition. Both systems would outfall into a proposed ponding area within the benefited area. The proposed ring levee does not create conflicts with the sanitary, water, or transportation infrastructure for the Hickson or Bakke communities.

2.3 Oxbow Golf Course

The proposed Oxbow, Hickson, and Bakke ring levee would create a need to re-configure the golf course as well as relocate the clubhouse and other facilities provided by the Oxbow Country Club. Eight golf holes and the driving range would need to be relocated and three other golf holes require alterations to accommodate the proposed ring levee. Interior drainage would be designed to convey water to a proposed retention basin. Sanitary sewer, storm sewer, water lines, and parking lots needed to service the Oxbow Country Club, the golf course, and the other amenities offered by the country club would be tied into the new urban infrastructure along the proposed Sunset Drive alignment.

2.4 Internal Drainage

The internal drainage for the Oxbow, Hickson, and Bakke ring levee would be comprised of a combination of open channels, storm sewer, a stormwater ponding area, and a storm sewer pump station. The combination of the available storage and pumping capacity of the pump station would be sized to prevent internal flooding during a river flood event when the gravity outfall is inoperable. The ponding area would be located east of the Bakke addition and northwest of the Cass County Highway 81.

The existing conditions in the city of Oxbow include a storm sewer network and overland drainage on the golf course. These systems both ultimately outfall into the Red River and would need to be altered to accommodate the proposed ring levee. The proposed storm sewer system would be routed to outfall into the proposed ponding area. The drainage in the proposed Oxbow addition would be part of a separate storm sewer system that would outfall into the proposed ponding area. The Bakke addition and the Hickson area currently use open ditches to accommodate their storm water runoff. Both areas would use the existing channels to accommodate runoff to the proposed ponding area. As a part of the storm water detention system, there would be a pump station located on the north end of the proposed ponding area, which, during times of flooding, would pump water out of the ponding area and into the Red River. The pump station design would include a sluice gate to allow the gravity system to be positively closed during periods of flooding to prevent back flow of floodwater.

In-Town Levee Mitigation Projects

Summary

The Project includes construction of levees and other flood protection infrastructure along the river and drainage ways through the Fargo-Moorhead metro area. The levees and related flood protection infrastructure are necessary to safely pass flood waters through town as part of the operation of the Project. Several studies and analysis have been conducted to determine the appropriate amount of flood water, and commensurate river stage to allow through town. Allowing higher flows and higher river stages through town reduces the frequency of operation of the Project, and reduces the extent and duration of the upstream mitigation area. As such, the in-town levee works are considered mitigation for the Project.

The most recent studies, conducted as part of the Governors' Task Force have concluded to allow a river stage of 37-feet through town, which equates to an approximately 20-year return frequency event. The cities of Fargo and Moorhead have completed several miles of in-town flood protection over the past years. The decision to allow 37-feet through town will require both Cities to design and construct additional levees and related flood protection improvements so that appropriate freeboard levels are in place for the higher flows through town.

Pre-PPA Medical Hardship Acquisition Program

NOTE: This Program was put into effect in 2011, and has been used successfully prior to the PPA being signed on July 11, 2016. Now that the PPA is signed, several parts of this program are outdated. However, the Diversion Authority will continue to accept requests for early acquisitions.

The Flood Diversion Authority hereby approves and establishes the following policy for the early buyout of residential property where it is determined that a property owner suffers from a Serious Health Condition giving rise to a hardship. Applications are encouraged from property owners who feel circumstances warrant considerations hereunder.

At the time of adoption of this policy, the United States Congress has not yet authorized the Diversion Project ("Project"), nor has Congress appropriated funds for the construction of the Project. Nevertheless, property owners living in areas potentially impacted by the Project assert the Project is already impacting their ability to sell their properties at fair market values and to finance such sales. The Diversion Authority recognizes that while it is difficult to quantify the impacts resulting from the impending Project on property values, or discern between Project-related impacts and general economic conditions or other market forces, the Diversion Authority wishes to establish a policy that will allow property owners who establish a serious health condition hardship to have their homes determined eligible for early buyout by the Diversion Authority or one of its member entities. It is recognized that, ultimately, the Project may require acquisition of a greater number of residential, and other, properties at a later date.

This policy is intended to be in effect prior to a Project Partnership Agreement (PPA) between the U.S. Army Corps of Engineers and the non-federal sponsors of the Project. This hardship policy may be amended to include additional considerations after the PPA is signed.

SECTION 1. DEFINITIONS. For purposes of this policy, the following definitions shall apply**:**

1.1 **Affected Property** means a parcel which the Hardship Review Committee determines is within the anticipated buy-out area associated with the Diversion Project, as proposed, that is used as a residence. To the extent a single parcel is used for multiple principal uses, such as residential and agricultural uses, the Hardship Review Committee may identify a portion of said parcel that shall, for purposes of this program, be deemed to be the "Affected Property" and any purchase offer for said Affected Property may be limited to such residential portion of said parcel. The Diversion Authority may designate, by map or boundary line, an area within which this program shall only apply. The area shall generally include the diversion and levee footprint, the storage area, and areas in the staging area with water depths greater than three feet.

1.2 **Affected Property Owner** means the owner or co-owners in fee of an Affected Property, whether one or more persons, firms or entities**.**

1.3 **Early Buyout List** means the list of Affected Properties for which applications for early buyout under this program have been approved by the Hardship Review Committee, as described in Section 3, herein.

1.4 **Hardship Review Committee** shall mean the decision-making body, consisting of three to five members, the membership of which shall be established by motion or resolution of the Diversion Board of Authority. The Diversion Board of Authority may authorize an existing committee or subcommittee to serve in the capacity of the Hardship Review Committee and to exercise the powers described herein.

1.5 **Program Administrator** shall mean a person who is authorized by the Diversion Board of Authority to administer the early buyout program described herein, as the same may be amended from time to time. Reference to the Program Administrator shall include any deputies or delegates that have been authorized by the Program Administrator to assist in the administration of this program**.**

1.6 **Serious Health Condition** shall mean a health condition suffered by a resident of an Affected Property that is**:**

a. a physical or mental health condition that requires assisted living care or significantly impairs a major life function, including but not limited to breathing, mobility or vision; or

b. physical or mental health condition that is life-threatening;

which condition shall be certified, in writing using the attached Certificate of Serious Medical Condition form, by a medical professional, including a medical doctor, doctor of osteopathy or licensed psychologist. The death of a resident of an Affected Property shall also be deemed a Serious Health Condition for purposes of this program.

SECTION 2. PROCEDURE FOR HARDSHIP DETERMINATION. The Hardship Review Committee is authorized to determine whether a property owner is eligible for an early buyout of residential property as a result of a Serious Health Condition in accordance with the following:

2.1 **Applications.** An Affected Property Owner may submit an application for determination of hardship to the Program Administrator. The Program Administrator may issue such form or forms necessary to facilitate the application process and to gather the information needed for review of the hardship application. An application must be accompanied by a qualified medical professional's certification that the

Affected Property Owner, or other individual residing within an Affected Property, suffers from a Serious Health Condition. The application must also include an explanation as to the circumstances which, in combination with the Serious Health Condition, require that the occupants of the Affected Property relocate and require that the Affected Property be immediately sold. The applicant must state the reason or reasons why the Serious Health Condition will not allow the Affected Property Owner sufficient time to sell the residence in question in the customary marketplace, but, instead, requires said residence to be sold immediately and purchased by the Diversion Authority (or one of its member entities).

2.2 Complete Applications. The Program Administrator is authorized to accept an application and to review the application for completeness. Applications that do not include required information may be returned to the applicant as incomplete and no further processing of the application will occur until the deficiencies are corrected. Once a complete application is accepted by the Program Administrator, the Program Administrator will schedule the matter for review by the Hardship Review Committee at a public meeting. The applicant will be provided with written notice of the time, date and location of the meeting at which the matter will be considered by the Hardship Review Committee. The notice to the applicant shall be deposited in the U.S. mail at least 10 days before the meeting.

2.3 Public Meeting—Review Criteria. The Hardship Review Committee shall consider the application at a public meeting along with any other relevant testimony or materials. The Hardship Review Committee shall consider the following criteria in its review of the application:

a. The extent to which the Serious Health Condition combines with the surrounding circumstances require the Affected Property Owner to move away from the Affected Property and require immediate sale of the Affected Property.

b. The extent to which the Serious Health Condition combines with the surrounding circumstances to make it difficult for the person with the Serious Health Condition and all other occupants of the Affected Property to continue residing at, and care for, the Affected Property.

c. The Committee may consider the financial hardship that may or will result from the continued occupancy and/or ownership of the Affected Property by either the person with the Serious Health Condition or the spouse or other occupant of the Affected Property. In other words, if the Serious Health Condition requires that person to be admitted to an assisted living facility, long-term health facility or other place for people requiring such special

needs, and such relocation will cause a significant financial hardship that requires immediate sale of the Affected Property, the Committee may consider such financial impacts. It is intended; however, that the Committee will not consider financial hardships other than those that are related to, or resulting from, a Serious Health Condition.

As stated above, although the existence of, or extent of, the negative impact of the Project upon the ability of any given Affected Property Owner to sell an Affected Property or upon the market value of an Affected Property, if any, is not known. For purposes of the administration of this program, the Committee may assume that an Affected Property Owner will not be able to immediately or promptly sell their Affected Property because of the pendency of the Project and, therefore, the Committee need only determine if the Serious Health Condition in combination with the other relevant circumstances warrants prompt or immediate sale and, if so, the Committee may approve an application and place the property on the Early Buyout List.

If an application for determination of hardship is denied by the Hardship Review Committee, the property owner may later reapply if circumstances have changed which the Affected Property Owner feels warrant such reapplication. An Affected Property Owner may not reapply for at least three months from the date of the Hardship Review Committee determination denying a prior application.

SECTION 3. EARLY BUYOUT LIST – PROCEDURE FOR DETERMINING PURCHASE OFFER. If the Hardship Review Committee determines that a hardship exists and the Affected Property is therefore eligible for early buyout; the Affected Property shall be placed on an early buyout list established and maintained by the Program Administrator [the "Early Buyout List"]. To the extent funds have been made available for the purchase of eligible Affected Properties under this program, the Program Administrator is authorized to extend an offer to purchase the Affected Property. The offer shall be based upon a good faith estimate as to the fair market value of the Affected Property as determined by the rules governing property acquisition associated with federal projects, defined fully in the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970", and Title IV, "Uniform Relocations Act Amendments of 1987".

3.1 Purchase Timeframe. Although the affected residential property for which a hardship has been determined will be placed upon the Early Buyout List immediately upon the hardship determination having been made by the Hardship Review Committee, actual purchases will occur as funds are authorized and made available by the Diversion Authority. Once the affected property owner and the governmental entity who will actually enter into the Purchase Agreement have arrived upon an agreeable price and other terms, parties will enter into a Purchase Agreement for the Affected Property.

3.2 Buyouts in Chronological Order. It is the intent of the Diversion Authority that actual purchase of Early Buyout List properties shall be acquired by the applicable governmental entity (Diversion Authority, County or City) based upon the order in which a complete application for early buyout was received; the Diversion Authority reserves the right to purchase a property out of chronological order where hardship circumstances warrant the same.

3.3 Voluntary Sale and Purchase. This program is intended to provide a method for identifying those properties that are eligible to be placed on the Early Buyout List. It is further intended that an offer to purchase the property is to be made based upon a good faith estimate of the fair market value, as described herein; however, the Affected Property Owner receiving the offer is not compelled in any way to accept such offer and the Affected Property Owner may reject such offer or any counteroffers without prejudice, this program being a voluntary buyout process and this is not a program based upon any power of eminent domain.

Hardship Application Form

Name:_____

Address:_____

Phone:_____ E-mail (if applicable):_____

1. Explain the circumstances which, in combination with the Serious Health Condition, require the occupants of the Affected Property to relocate and the Affected Property be immediately sold (use additional paper if necessary):

_____

_____

_____

_____

_____

_____

2. Explain how the Serious Health Condition does not allow the Affected Property Owner sufficient time to sell the residence in question in the customary marketplace, but instead requires said residence to be sold immediately and purchased by the Flood Diversion Board of Authority (or one of its member entities) (use additional paper if necessary):

_____

_____

_____

_____

_____

_____

This Hardship Application Form **must** be completed and submitted with the Physician's Certificate to:

Cass County Auditor's Office
P.O. Box 2806
Fargo, ND 58108-2806

INFORMATION IN THIS FORM IS PUBLIC INFORMATION UNDER NORTH DAKOTA OPEN RECORDS PROVISIONS

Physician's Certificate of Serious Health Condition

I hereby certify that _____ of

(Applicant)

_____

(Address)

Has a serious medical condition that impacts a significant life function, such as breathing, walking, and engaging in other everyday life activities.

Physician Comments:

_____

_____

_____

_____

Effective Date of Disability: _____

_____

Physician

Date: _____

_____

Physician's Address

This Physician's Certificate **must** be completed and submitted with the Hardship Application. A doctor of medicine or licensed psychologist shall sign this statement indicating a serious health condition exists, and that as a result of such condition the homeowner will experience a long term or permanent period of incapacity.

Send Physician's Certificate and Hardship Application to:

Cass County Auditor's Office
P.O. Box 2806
Fargo, ND 58108-2806

INFORMATION IN THIS FORM IS PUBLIC INFORMATION UNDER NORTH DAKOTA OPEN RECORDS PROVISIONS

Adaptive Management and Mitigation Plan

Introduction

An adaptive management plan for compensatory mitigation sites was prepared by the U.S. Army Corps of Engineers, St. Paul District (USACE) as part of the Final Feasibility Report and Environmental Impact Statement for the Fargo-Moorhead Metropolitan Area Flood Risk Management Project dated July 2011. The adaptive management plan was provided as Attachment 6 to that report. The Adaptive Management and Mitigation Plan (AMMP) is a living document, and MN State EIS (2016) provided suggestions for the AMMP.

The Diversion Authority is committed to reviewing and periodically updating the AMMP. The USACE plan and suggestions provided in the MN State EIS include details on monitoring techniques, locations, and frequencies, along with suggestions for identification of performance standards, protocols, etc. The Project AMMP will continue to be a collaborative agency effort.

AMMP Funding

The Diversion Authority will establish an on-going O&M Funding Program and utilize either sales taxes or a maintenance district, or a combination of both to fund the mitigation of impacts identified by the AMMP process.

Environmental Mitigation

A. Environmental Impacts and Mitigation

All effects of the Project, both adverse and beneficial, are described in the Final MN EIS, Chapter 3. Mitigation is described for all impacts in the Final MN EIS, Chapter 6, Appendix B, and Appendix O. Additional details will be developed as the design phase progresses. Mitigation shall be in accordance with federal requirements; mitigation undertaken beyond the federal requirement will be the responsibility of the Diversion Authority. Potential environmental hazards and mitigation for Project impacts are described in the Final MN EIS, Chapter 3.7.

It should be noted that the base no action alternative would do nothing to address existing recognized environmental conditions (RECs) within the existing floodplain, and Project mitigation would significantly reduce environmental hazards throughout the inundated areas affected by the Project. In addition, the Project would significantly reduce flood impacts to RECs located in benefitted areas. The Project will reduce impacts from environmental hazards.

B. Water Supply Impacts and Mitigation

The federal EIS did not identify any significant adverse impacts to water supply. The authorized action would improve water supply through reduced risk of contamination or loss of water supply during floods. Water use is described in Section 13 of the Scoping Environmental Assessment Worksheet (MN). Impacts and mitigation for rural water supply utilities are described in the MN Final EIS, Section 3.13.3.3. Impacts and mitigation for water wells are described in the Final MN EIS, Section 3.16.2.3.6.

C. Groundwater or Sub-Surface Water Impacts and Mitigation

The federal EIS identified a low likelihood of potential impacts to aquifers (Section 5.2.1.6.1). Groundwater is discussed in Section 12 of the Environmental Assessment Worksheet (MN) dated April 12, 2013, which states “The Project is not expected to have adverse impacts to the cumulative condition of aquifers or shallow groundwater in the region.” There is no mitigation proposed for aquifers. Groundwater monitoring is discussed in the Final MN EIS, Appendix B, page 7.

D. Navigation Impacts and Mitigation

Navigation on the Red River and tributaries is primarily recreation-related. No impacts to recreational opportunities were identified in the federal EIS (Section 5.2.3.1.3). This would include recreational boating. The Project would only operate under moderate to high flood conditions when such activities would already be limited if not impossible and dangerous. No mitigation is proposed for navigation. There is a Recreational Plan described in Appendix M of the federal EIS. Watercraft use is discussed in Section 15 of the Environmental Assessment Worksheet (MN).

E. Drainage Impacts and Mitigation

Drainage features of the Project are described in the Final MN EIS, throughout Chapter 2 and specifically in Section 2.1.1.9. The Project will affect water surface elevations in the upstream inundated area while

it is in operation, including drainage ditches that convey flow to the Red River and Wild Rice River in the vicinity of the upstream mitigation area. When the Project control structures are not in operation, there will be no effect on drainage systems upstream. Potential geomorphic changes that could possibly affect drainage over many years are discussed in the Final MN EIS, Section 3.3 STREAM STABILITY. Specific drainage issues raised in public comments are discussed and responded to with possible mitigation options in Appendix L, including comment #72cc on page 97, comment #112h on page 100, comments summarized on page 104, comment #72t on page 134, and comment #128f on page 138.

F. Fish and Wildlife Habitat Impacts and Mitigation

Details on potential impacts to fish and wildlife habitat was exhaustively discussed in the federal EIS (Section 5.2). Proposed mitigation and monitoring also has been discussed in Attachment 6 of the federal EIS as well as in section 6 of the MN EIS. Any updates to potential effects have been included in the Supplemental federal EA (FONSI signed September 2013). Mitigation for the proposed action has included various features to minimize the frequency that the Project would operate, including in-town floodwalls and levees. Since the completion of the federal EIS additional details on fish and wildlife habitat mitigation and monitoring have been developed through long, extensive coordination with MDNR and other resource agencies. These includes:

Fish Passage/Connectivity

- Fish passage and connectivity impacts and mitigation is described in the MN EIS page ES-49 and Section 3.8.
- Drayton Dam Fish Passage Project: includes completion of draft Plans and Specs and an Environmental Assessment specific to this action (FONSI signed January 2013). This project is located in both ND and MN, has been strongly supported by NDSWC and MDNR, and would be ready to construct pending funding and applicable permits from USACE, NDSWC, and MDNR.
- Wild Rice Dam Removal Fish Passage Project: includes completion of draft Plans and Specs and an Environmental Assessment specific to this action (FONSI signed October 2014). This project is located entirely within North Dakota and would be ready to construct pending funding and applicable permits.
- It must be noted that allowing 37-feet through the Fargo-Moorhead metro area vs 35-feet through the Fargo-Moorhead metro area per the Governors' Task Force will further decrease frequency of operation of the Project, and therefore reduce potential impacts to fish Passage and mortality. This requires a re-evaluation of the need for mitigation to include Drayton Dam modification and Wild Rice Dam removal.

Aquatic Habitat

- Aquatic habitat impacts and mitigation for the Project are described in the MN EIS page ES-50, section 3.8.2 (impacts) and section 3.8.3 monitoring and mitigation. More recently the agency team has been meeting and has discussed pursuing mitigation projects on the Bois de Sioux River and the Lower Otter Tail River. We will continue to coordinate with the natural resource agency team, including MDNR. A draft plan has been prepared and submitted as part of the Section 404 authorization request to USACE regulatory - Omaha district dated August 23, 2016; see "D3: Mitigation Proposal for Aquatic Habitat Impacts July 2016" attached.

Forest Land

- Forested wetland and upland forest mitigation is described in the MN EIS page ES-44, section 3.9 impacts, 3.4.3 (mitigation and monitoring) and 3.9.3 (mitigation and monitoring). A more detailed draft plan for much of this mitigation has been prepared and submitted as part of the Section 404 authorization request to USACE regulatory Omaha District dated August 23, 2016 ; see "D2: Forested Wetland Mitigation Plan April 2016", attached.
- A 13 acre forest mitigation project has already been partially developed along the Red River. This area was in farm production until 2014 where it was abandoned and has regenerated naturally with four native tree species. An additional five native tree and shrub species have been planted at the site to add diversity. Monitoring wells have been installed to monitor hydrology to the site, to determine how many of the 13 acres will be considered forested wetland mitigation.

Rush / Lower Rush Rivers

- Impacts to the Rush and Lower Rush Rivers via cut off from the Diversion Channel are not deemed to be significant and not warranting mitigation. These two streams/rivers are channelized and essentially function as a ditch conveying flow. They do function as habitat under some conditions, but they are significantly degraded. They also are intermittent, especially during late summer. Moreover, the Project will re-route flow into the bottom of the diversion channel where we will attempt to provide some level of sinuosity and habitat value. This habitat value would be similar to, and perhaps slightly greater than what occurs under existing conditions, as coordinated with the natural resource agencies.

Cold Weather Impacts

- Fish, macroinvertebrate, and physical habitat monitoring has been conducted in 2011 and 2017. The monitoring plan for this work was worked on collaboratively with the state and federal agencies. Monitoring during the winter months was never suggested by this team as fish typically don't move much during this time. During initial design of the Maple River Aqueduct, expertise was sought from the Cold Regions Research and Engineering Laboratory (CRREL). Ideas developed by this group have been incorporated into the indicative design to ensure that freeze-up will not occur during the winter months assuming it wouldn't have occurred with existing conditions. A flow gauge or some other method of monitoring could be implemented to ensure flow is continuous, if that is required.

G. Agricultural Impacts and Mitigation

Adverse effects to agriculture and farmland are discussed at length in the federal EIS (Section 5.2) as well as the supplemental EA. Agricultural impacts are discussed in the Final MN EIS in Section 3.16.2.3.8 on pages 3-252 through 3-258. Mitigation for agricultural impacts is described in the Final MN EIS, Chapter 6; mitigation will be strictly adhered to according to federal law and a takings analysis as it relates to lost property or crop production due to Project features or Project operation. Some property has already been purchased outright, with additional real estate actions to be pursued over the next few

years. The Diversion Authority is also committed to a summer operation supplemental crop loss program as described elsewhere within the Mitigation Plan.

H. Waterways, Bank Stability, Erosion, and Sedimentation Impacts and Mitigation

Potential effects to waterways, bank stability, erosion and sedimentation within and outside the existing channel and floodplain (including newly inundated areas) has been discussed at length in the federal EIS (geomorphic impacts discussion including Section 5.2). These impacts and related monitoring are also described in the Final MN EIS, Section 3.3 and Appendix B. As outlined in the Final federal EIS and the MN EIS, no significant adverse impacts are anticipated. The Project would not likely have a significant effect on stream stability and geomorphology throughout the potentially impacted/affected environment. The Project has incorporated multiple features to reduce the frequency the Project would operate in the future. This was done specifically to minimize potential adverse effects to multiple resource types, including geomorphology. With reduced Project operations, no significant adverse effects are anticipated, and no mitigation is proposed. However, geomorphic conditions will be monitored as a part of the Adaptive Management and Monitoring Plan for the Project. The approach for monitoring has been discussed at length with the natural resource agency team, including geomorphology experts from the MDNR. The monitoring plan for geomorphology has been developed, and will be revised over time, as needed, to capture any new concerns. Pre-Project geomorphology monitoring is on schedule to be conducted summer/fall 2018. The scope of work for the pre-Project geomorphology monitoring was developed through a collaborative effort with participating agencies.

I. Wetlands and Land Use Impacts and Mitigation

Adverse effects to wetlands are discussed at length in the federal EIS (Section 5.2) as well as the supplemental EA and the Final MN EIS, Section 3.4 and Tables 6.4, 6.5, 6.6, and 6.7. These includes impacts from direct actions (e.g., footprint impacts) as well as indirect effects (e.g., altered hydrology). Mitigation planning is well underway, with some features already established. USACE has coordinated with its regulatory office to ensure the Project is in compliance with Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.

- Wetlands will be created and/or restored in the bottom of the diversion channel as described in the Federal EIS Attachment 6 section 3.3 and Final MN EIS, Section 3.4.3. The channel would be planted with native wetland species on the bottom and the fringe of the side slopes of the channel, with the remainder of the side slopes being planted as a prairie swale type community.
- Additional wetland projects have been developed to mitigate for impacts that have occurred before the diversion channel would be constructed to include the OHB project, Diversion Inlet project and County Rd 16 and 17 re-alignment project.
- Attached is a more detailed description of the wetland mitigation plan that was submitted to USACE regulatory office on 23 August 2016 as part of the Section 404 authorization request package.
- In Minnesota, construction of the Southern Embankment and associated infrastructure is anticipated to impact up to 30 acres of wetlands. These wetlands primarily consist of seasonally

flooded basins and shallow ditches in agricultural fields and roadside ditches. Some of these impacts to wetlands may be regulated pursuant to the requirements of the Wetland Conservation Act (WCA). The wetland delineation for the new alignment is currently being updated using the methods described in the U.S. Army Corps of Engineer Wetland Delineation Manual, Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0), and Guidance for Offsite Hydrology/Wetland Determinations. The local government units (LGU) administering WCA (Clay Soil and Water Conservation District and Wilkin County) will be consulted to identify the requirements of WCA for wetlands identified during this update. As applicable, a replacement plan will be submitted for LGU review and approval for impacts to wetlands resulting from construction of the Southern Embankment and associated infrastructure in Minnesota. Mitigation for wetland losses subject to the replacement requirements of WCA will be completed in accordance with the WCA rule, either through mitigation banking or completion of project specific mitigation located in Minnesota. If project specific mitigation is proposed, monitoring would be conducted in accordance with the criteria and procedures set forth in the Federal adaptive management plan included in the Federal EIS.

K. Invasive Species Management Plan

A formal invasive species management plan will not be prepared for this Project. The Project is not anticipated to contribute to the spread of invasive species. Invasive species concerns may be addressed individually within mitigation areas for wetlands or floodplain forest to ensure mitigation success. Plans and specifications for all construction actions also will require that construction equipment is free of AIS and does not contribute to the spread of invasive species.

The Red River of the North is listed as an infested water by MDNR for zebra mussel. Construction activities affecting the Red River may require a MDNR prohibited invasive species and infested waters permit. The Project proponents will work with MDNR to identify the need and requirements for these permits. As necessary, a permit application will be submitted before beginning any work in the Red River of the North.

Attachments

- D1 – Diversion Channel Site Mitigation Plan – April 2016 (17 pages)
- D2 – Forested Wetland Mitigation Plan – April 2016 (8 pages)
- D3 – Aquatic Habitat Mitigation Plan – July 2016 (6 pages)

D1 - Diversion Channel Site Mitigation Plan
April 2016

Objectives

Construction of the diversion channel will result in the creation of flow-through shallow marsh wetlands in the lowest portions of the channel bottom and fresh wet meadow wetlands between the deeper water areas and the upland slope. A portion of these areas will be identified and managed as a mitigation site and will be used to offset unavoidable project impacts to wetlands. The mitigation site described in this Diversion Channel Site Mitigation Plan (DCSMP) will result in the creation of 1540 acres of wetlands. This amount is more than what is required to offset the impacts authorized by the North Dakota Regulatory Office (NDRO) Clean Water Act Section 404 permit. The surplus of wetlands created under this mitigation plan will be used as mitigation for impacts associated with the federally constructed portion of the project in North Dakota. Currently, the amount of compensatory mitigation required for the NDRO Section 404 permit is estimated to be 1304.6 acres. The additional 236 acres of wetlands created at the site will be applied toward the mitigation requirement for the federally constructed features.

The wetland mitigation site will fully offset the impacts of the project by providing a continuous wetland corridor composed of several wetland plant community types adjacent to a created meandering low flow channel. The functions of the wetlands at the mitigation site will be greater than those of the impact sites because the mitigation areas will not be subject to regular disturbance (diking, plowing, and drainage) and native plant communities will be established and maintained. The mitigation site will be located in the Red River of the North watershed which is the same watershed where the impacts will occur.

Site Selection

Site selection was based primarily on opportunities associated with construction of the diversion channel. Specifically, these included: (1) Availability of lands that would be acquired for the project; (2) Potential for self-sustaining wetlands as a result of hydrology supplied by tributaries to the Red River of the North, groundwater discharges, and periodic overbank flow from the meandering channel during flood events; (3) Potential to create a 30 mile long wetland/river corridor that operates as a system and connects with the Red River of the North in a landscape highly altered and fragmented by roads, agriculture, and other types of development; (4) Limited opportunities to pursue other large scale mitigation projects to offset unavoidable project impacts to wetlands.

Site Protection Instrument

A conservation easement or other protective mechanism will not be used for the mitigation site. Because of the flood damage reduction purpose of the diversion channel there will be a need to periodically perform maintenance activities in the channel to insure that design flows can be effectively conveyed during periods of operation. Although this will represent a form of disturbance, the removal of accumulated sediment and other debris from the diversion channel will help maintain the quality and quantity of wetlands in the diversion channel. If these activities are not performed some wetland areas would likely be converted to non-wetlands over time as sediment and other debris is deposited during periods of project operation.

The diversion channel will, however, be owned by the Diversion Authority (public ownership) throughout the life of the project. The operation and maintenance manual prepared for the project and provided to the Diversion Authority upon completion will specify the requirements for maintaining the quality and quantity of the wetlands in the diversion channel after construction is completed.

Baseline Information

The location and amount of wetlands impacted by the project and the amount that would be located in the diversion channel itself is discussed in Section 5.2.1.5 of the FEIS and augmented by Section 5.3 of the Supplemental Environmental Assessment prepared by the U.S. Army Corps of Engineers, St. Paul District in September 2013.

Determination of Credits

The analyses in the FEIS indicated that there would be sufficient opportunity to mitigate for all of the non-forested wetland impacts in the diversion channel at a minimum of one acre created for each acre impacted. In 2016, the Corps and the non-Federal sponsors conducted an analysis to determine the amount of mitigation that would be required if compensatory mitigation requirements were to be fulfilled based on functional replacement. The functional assessment was focused on seasonally flooded basins located on agricultural lands (FSFBs) since this wetland type represented the vast majority of the wetlands impacted by the project and there was likely a strong potential to realize a discernible difference between the function of impacted wetlands and properly constructed mitigation sites. A description of the methodology and results of the assessment is provided as Attachment 1 to this plan. The functional approach was coordinated with the regulatory agencies in North Dakota with authority over the project in March 2016. There were no objections to the approach. Based on the functional assessment, the amount of mitigation required for FSBS will be 0.88 acre for each acre impacted resulting in a final mitigation requirement of 1150.1 acres of mitigation (assuming that the mitigation site is consistent with that used in the analysis).

Compensatory mitigation requirements for other non-forested wetland types (shallow marsh and wet meadow) were not altered subsequent to the FEIS and SEA and remains at least at a minimum of one acre created for each acre impacted. Thus, the diversion channel mitigation site, at a minimum, will result in the creation of 1304.6 acres of wetlands. This total also includes credits for native upland buffers along the side slopes of the channel credited at 4:1.

Mitigation Work Plan

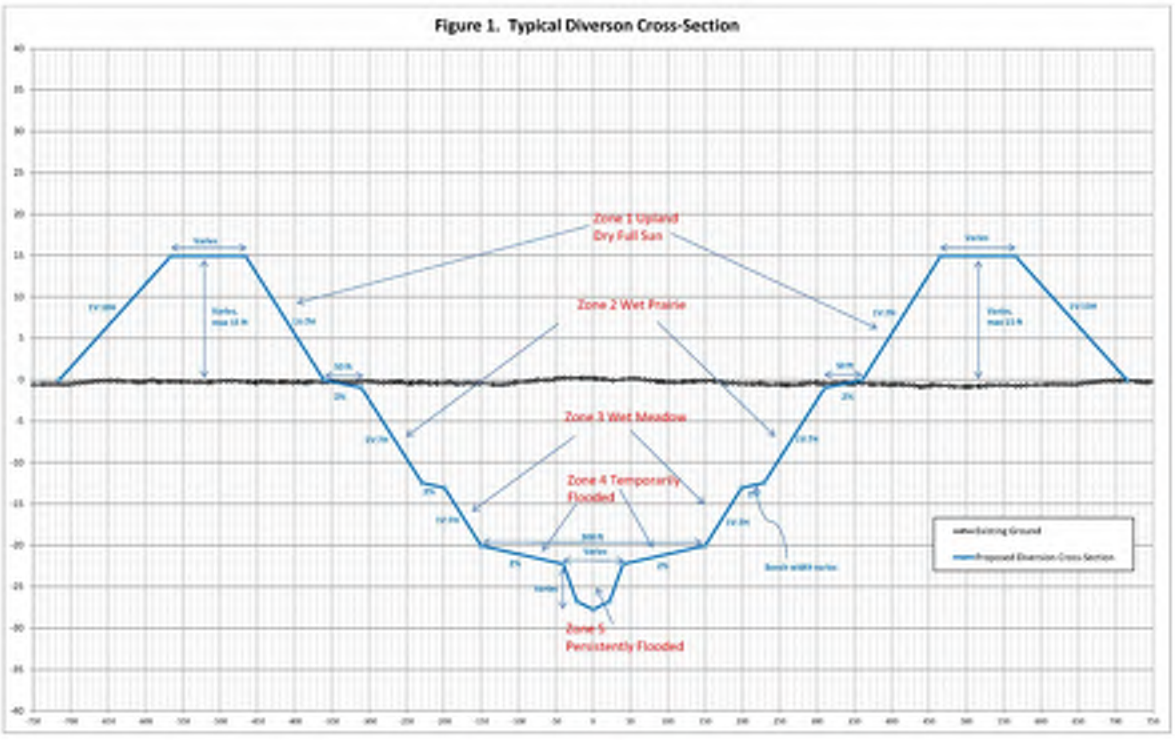
The diversion channel mitigation site will consist of the following features: a meandering low flow channel, rock riffle structures (grade control) within the low flow channel to create ponded areas, three wetland plant community types, and upland buffer. The low flow channel will be approximately 80 feet wide and 6 feet deep at the downstream end and will be slightly smaller upstream, and will meander across the diversion channel bottom. The diversion channel will be constructed over a period of approximately six years. Therefore, the mitigation site will be constructed in phases, as sections of the diversion channel are completed. Hydrology for the created wetlands outside of the low flow channel will be supplied primarily by precipitation and supplemented by overbank flow from the meandering low flow channel and groundwater seepage from the banks of the channel. The diversion channel

bottom will include scrapes and depressional areas to increase diversity in habitat types. Development of the diversion channel mitigation site is constrained by the following requirements:

- The roughness coefficient for the diversion channel (Manning's n coefficient) cannot exceed 0.03 in order to maintain the conveyance capacity of the diversion channel. Therefore woody plants are not part of the planting plan for the mitigation site and any woody species that become established in the diversion channel will be removed as part of the routine maintenance activities;

- The diversion channel will be subject to periodic maintenance activities to maintain its capacity and integrity. Periodic maintenance may include the following activities: correction of erosion problems, removal of excessive accumulated sediment, and reconstruction of the low flow channel if it migrates to within 50 feet of the toe of the diversion channel.

The planting area consists of the entire diversion channel and its features which include: the excavated material berm piled along the diversion channel (zone 1), the 1V:7H slopes leading down to the bottom of the channel (zones 2 and 3), the 2% slopes leading to the low flow channel (zone 4) and finally the low flow channel (zone 5) see figure 1.



The seed mixes for the site are designed or selected to increase diversity, create competition for invasive species, and to promote plant community stability. They also are satisfactory to ensure that the roughness created by these plants will not have an adverse impact on the conveyance of channel flows.

The native seed mix design manual from the Minnesota Department of Transportation (MNDOT) was used to guide the selection of seed mixes and/or specific plant recommendations. For zones 1-3 seed mixes were adapted from the manual and are based on standard mixtures used by MNDOT, the Minnesota Board of Water and Soil Resources (BWSR) and the Minnesota Department of Natural Resources (MNDNR). Additional species were also added for more diversity and enhanced adaptation to the environmental conditions, and plants more adapted to North Dakota were added to the Minnesota mixes. For zones 4-5, the seed mix is made up of a combination of existing seed mixes with additional species incorporated to help satisfy the other criteria of the planting plan.

A cover crop of oats and/or winter wheat with native soil stabilizing grasses will also be used for all seed mixes.

a) Zone 1: The seed mix proposed for zone 1 is a Mesic Prairie mix. Warm-season prairie grasses will have the highest success rate if planted between April 15 and June 30. Prairie forbs and sedges will have the highest success rate if planted from Oct 15 – frozen soils. The choice for seeding time will depend on construction completion date, site preparation, and weed control needs. Grass and forbs seeding rates may be adjusted to account for seeding time.
b) Zone 2: The seed mix proposed for zone 2 is the recommended Wet Prairie Mix. Warm-season prairie grasses will have the highest success rate if planted between April 15 – June 30. Many wetland grasses are cool season grasses and will have a higher success rate if planted Oct 15 – frozen soils. Wetland sedges and forbs and prairie sedges and forbs will have the highest success rate if planted from Oct 15 – frozen soils. The choice for seeding time will depend on construction completion date, site preparation, and weed control needs. Grass and forbs seeding rates may be adjusted to account for seeding time.
c) Zone 3: The seed mix proposed for zone 3 is the recommended Wet Meadow mix. Warm-season prairie grasses will have the highest success rate if planted between April 15 – June 30. Many wetland grasses are cool season grasses and will have a higher success rate if planted Oct 15 – frozen soils. Wetland sedges and forbs and prairie sedges and forbs will have the highest success rate if planted from Oct 15 – frozen soils. The choice for seeding time will depend on construction completion date, site preparation, and weed control needs. Grass and forbs seeding rates may be adjusted to account for seeding time.
d) Zones 4 and 5: The seed mix proposed for zones 4 and 5 is a combination of the recommended Temporary Flooded Mix, Persistently Flooded Mix, and from expert opinions to create a combined mix (Table 4). Warm-season prairie grasses will have the highest success rate if planted between April 15 – June 30. Many wetland grasses are cool season grasses and will have a higher success rate if planted Oct 15 – frozen soils. Wetland sedges and forbs and prairie sedges and forbs will have the highest success rate if planted from Oct 15 – frozen soils. The majority of species in the wetter zones are cool-season grasses and sedges. The choice for seeding time will depend on construction completion date, site preparation, and weed control needs. Grass and forbs seeding rates may be adjusted to account for seeding time. In addition to seeding, Zone 4 and 5 will be planted with plugs of certain species to promote rapid

stabilization of the low-flow channel banks. Many wet plant species do not succeed from seed, but have very high success rates and rapid growth from plugs.

The species contained in each seed mix are provided in Attachment 2 to this plan.

Maintenance Plan

After initial construction of a diversion channel mitigation site phase, it will be monitored annually to assess the success in creating wetlands along the channel bottom. Periodic mowing, burning, and spot treating with herbicide will be required to control the establishment of non-desirable species and increase the successful establishment of planted species. Once seeded, it is anticipated that native grasses will take approximately three to five years to become established under favorable growing conditions.

Other adaptive management measures may be employed to address vegetative or hydrologic concerns identified during and after the initial establishment period. Maintenance needs will be identified as part of the annual monitoring conducted to determine compliance with the mitigation performance standards for the site and as part of the periodic inspections conducted in accordance with the operation and maintenance plan for the project.

Performance Standards

The following performance standards have been established for the wetlands at the diversion channel mitigation site:

Seasonally Flooded Basin Wetland Compensatory Mitigation Performance Standards

1. Seasonally flooded basin plant community types shall achieve a species composition that includes ten or more species of native/non-invasive grasses, sedges, ferns, rushes and/or forbs by the end of the fifth full growing season. Alternatively, a MnRAM vegetative diversity and integrity rating of “high quality” at the end of the fifth full growing season will also satisfy this performance standard.

2. More than 50 percent of vegetative areal cover within the wetland communities of the mitigation site shall be composed of FAC, FACW or OBL species.

3. Control of invasive and/or non-native plant species shall be carried out for five full growing seasons. Control shall consist of mowing, burning, disking, mulching, biocontrol and/or herbicide treatments. By the third growing season, any areas one-quarter acre in size or larger that have greater than 50 percent areal cover of invasive and/or non-native species shall be treated (e.g., herbicide) and/or cleared (e.g., disked) and then reseeded. Follow-up control of invasive and/or non-native species shall be implemented as stated above.

4. Hydrology shall consist of inundation by a few inches to 24 inches of water for a minimum of 14 consecutive days during the growing season under normal to wetter than normal hydrological conditions (the 70 percent of years based on the most recent 30-year record of precipitation). Inundation shall be

typically absent following the first 6 weeks of the growing season and the water table typically drops below 12 inches from the soil surface for the majority of the growing season in most years (≥50 percent). Minor deviations from this hydrology standard shall be allowed provided monitoring data demonstrates that the site has wetland hydrology and the Corps concurs that the vegetative performance standards for a seasonally flooded basin have been achieved.

Shallow Marsh Wetland Compensatory Mitigation Performance Standards

1. Shallow marsh plant community types shall be dominated by three or more native aquatic species, with at least four native species occurring within areas demarcated as shallow marsh by the end of the 5th full growing season. Alternatively, a MnRAM vegetative diversity and integrity rating of "high quality" at the end of the fifth full growing season will also satisfy this performance standard.

2. More than 50 percent of vegetative areal cover within the wetland communities of the mitigation site shall be composed of FAC, FACW or OBL species.

3. Control of invasive and/or non-native plant species shall be carried out for five full growing seasons. Control shall consist of mowing, burning, disking, mulching, biocontrol and/or herbicide treatments. By the third growing season, any areas one-quarter acre in size or larger that have greater than 50 percent areal cover of invasive and/or non-native species shall be treated (e.g., herbicide) and/or cleared (e.g., disked) and then reseeded. Follow-up control of invasive and/or non-native species shall be implemented as stated above.

4. Hydrology shall consist of a water table ≤6 inches below the soil surface, to inundation up to 6 inches in depth, for a minimum of 56 consecutive days, or two periods of 28 or more consecutive days, or four periods of 14 or more consecutive days, during growing seasons under normal to wetter than normal hydrological conditions (the 70 percent of years based on the most recent 30-year record of precipitation). During the growing season, inundation up to 18 inches in depth is permissible during wetter than normal years or in response to precipitation events provided that the duration does not exceed 28 consecutive days (i.e., water depth drops from 18 inches to 6 inches within 28 days).

Wet Meadow Wetland Compensatory Mitigation Performance Standards

1. Wet meadow plant community types shall achieve a species composition that includes ten or more species of native/non-invasive grasses, sedges, ferns, rushes and/or forbs by the end of the fifth full growing season. Alternatively, a MnRAM vegetative diversity and integrity rating of "high quality" at the end of the fifth full growing season will also satisfy this performance standard.

2. More than 50 percent of vegetative areal cover within the wetland communities of the mitigation site shall be composed of FAC, FACW or OBL species.

3. Control of invasive and/or non-native plant species shall be carried out for five full growing seasons. Control shall consist of mowing, burning, disking, mulching, biocontrol and/or herbicide treatments. By the third growing season, any areas one-quarter acre in size or larger that have greater than 50 percent areal cover of invasive and/or non-native species shall be treated (e.g., herbicide) and/or cleared (e.g., disked) and then reseeded. Follow-up control of invasive and/or non-native species shall be implemented as stated above.

4. Hydrology shall consist of a water table 12 inches or less below the soil surface for a minimum of 28 consecutive days, or two periods of 14 or more consecutive days, during growing seasons under normal to wetter than normal hydrological conditions (the 70 percent of years based on the most recent 30-year record of precipitation). Depth of inundation during the growing season shall typically be 6 inches or less with duration of less than 14 consecutive days (Exceptions can be made for wetter than normal years or sites with hummocky microtopography where hollows between hummocks can have standing water depths up to 6 inches for extended periods of time). Minor deviations from this hydrology standard shall be allowed provided monitoring data demonstrates that the site has wetland hydrology and the Corps concurs that the vegetative performance standards for a wet meadow have been achieved.

Monitoring Requirements

Post-construction monitoring shall be conducted to determine the type, quality, and amount of wetlands created as compensatory mitigation for the unavoidable impacts of the Project. The purpose of the monitoring is to provide information to determine if the site is successful in meeting its performance standards. The monitoring period for non-forested wetlands shall be five years. This period may be shortened if the monitoring reports demonstrate that the mitigation site(s) has met its performance standard(s) in two consecutive reports and the regulatory agencies and the Corps of Engineers concur that additional monitoring is not required.

Monitoring reports shall be concise and effectively provide the information necessary to assess the status of the compensatory mitigation project. Monitoring shall commence the first full growing season following completion of construction (construction includes earth moving, excavation and other physical work as well as planting and seeding). The first monitoring report shall be submitted on or before December 31st of the first monitoring year. Subsequent reports shall be submitted on or before December 31st for the following four years (total of five reports).

Monitoring reports shall contain the following information and any additional information necessary to evaluate the performance of the mitigation site:

1. Name of party responsible for conducting the monitoring and the date(s) the inspection was conducted;
2. A brief paragraph describing the mitigation acreage and type of aquatic resources authorized to compensate for the aquatic impacts;
3. Written description of the location of the compensatory mitigation project including information to locate the site perimeter(s), and coordinates of the mitigation site (expressed as latitude, longitudes, UTMs, state plane coordinate system, etc.);
4. Dates the compensatory mitigation project commenced and/or was completed;
5. Short statement on whether the performance standards are being met;
6. Summary data, including photo documentation, to substantiate the success and/or potential challenges associated with the compensatory mitigation project;
7. Maps showing the location of the compensatory mitigation site relative to other landscape features, habitat types, locations of photographic reference points, transects, sampling data points, monitoring well locations, and/or other features pertinent to the mitigation plan;
8. A summary of the amounts and type of wetlands restored, enhanced, and created at the mitigation site identified by wetland plant community types based on Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed).

9. Dates of any recent corrective or maintenance activities conducted since the previous report submission;
10. Specific recommendations for any additional corrective or remedial actions.

The final monitoring report shall also include a wetland delineation completed in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region*.

Long-term Management Plan

As part of the Federal flood damage reduction project for the Fargo-Moorhead metropolitan area the diversion channel wetland mitigation site will be turned over to the non-federal Sponsor (the Diversion Authority) once construction of the project is completed. The non-federal sponsor would then assume responsibility for maintenance and management of the mitigation site in accordance with the project partnering agreement which lays out the requirements for the long-term management of the site. The agreement will be consistent with the goals and objectives for the site summarized in the DCSMP.

Adaptive Management Plan

An adaptive management plan for compensatory mitigation sites was prepared by the U.S. Army Corps of Engineers, St. Paul District as part of the Final Feasibility Report and Environmental Impact Statement for the Fargo-Moorhead Metropolitan Area Flood Risk Management Project dated July 2011. The adaptive management plan was provided as Attachment 6 to that report. The AMMP is a living document, and MN State EIS (2016) provided suggestions for the AMMP.

Financial Assurance

A financial assurance is not proposed for this mitigation site since it is part of a Federal project undertaken by the U.S. Army Corps of Engineers. The Corps will ensure that the mitigation site is constructed in accordance with the mitigation plan and meets the established performance standards.

Attachment 2 Wetland Seed Mixes by Plant Community Type

ZONE 1 MESIC PRAIRIE SEED MIX

Forbs

Description	
Agastache foeniculum	Anise Hyssop
Allium stellatum	Prairie Onion
Apocynum sibiricum	Clasping Dogbane
Artemisia ludovciana	White sagebrush
Asclepias verticillata	Whorled Milkweed
Astragalus canadensis	Canada Milk Vetch
Dalea candida	White Prairie Clover
Dalea purpurea	Purple Prairie Clover
Desmodium canadense	Showy Tick Trefoil
Galium boreale	Northern Bedstraw
Glycyrrhiza lepidota	Wild Licorice
Helianthus pauciflorus	Showy Sunflower
Heliopsis helianthoides	Early Sunflower
Heuchera richardsonii	Prairie Alumroot
Lathyrus venosus	Veiny Pea
Liatris aspera	Rough Blazing Star
Liatris pycnostachya	Prairie Blazing Star
Monarda fistulosa	Wild Beragmot
Oenothera biennis	Common Evening Primrose
Pedicularis canadensis	Wood Betony
Pycnanthemum virginianum	Mountain Mint
Ratibida columnifera	Long-headed Coneflower
Rudbeckia hirta	Black-eyed Susan
Solidago nemoralis	Old Field Goldenrod
Solidago rigida	Stiff Goldenrod
Solidago speciosa	Showy Goldenrod
Symphyotrichum ericoides	Heath Aster
Symphyotrichum laeve	Smooth Blue Aster
Thalictrum dasycarpum	Purple Meadow Rue
Verbena hastata	Blue Vervain
Zizia aptera	Heart-leaf Golden Alexanders

TREES, SHRUBS & VINES

Description	
Amorpha canescens	Lead Plant

GRASSES, SEDGES & RUSHES

Description	
Andropogon gerardii	Big Blustem
Bouteloua curtipendula	Side-Oats Grama
Bouteloua gracilis	Blue Grama
Bromus kalmii	Prairie Brome
Carex brevior	Shortbeak Sedge
Deschampsia cespitosa	Tufted Hairgrass
Elymus canadensis	Canada Wild Rye
Elymus trachycaulus	Slender Wheatgrass
Hesperostipa spartea (syn. Stipa spartea)	Porcupine Grass
Koeleria cristata	June Grass
Muhlenbergia glomerata	Marsh Muly
Muhlenbergia richardsonis	Mat Muhly
Panicum virgatum	Swtichgrass
Pascopyrum smithii	Western Wheatgrass
Schizachyrium scoparium	Little Blustem
Sorghastrum nutans	Indian Grass
Sphenopholis obtusata	Prairie Wedgegrass
Sporobolus heterolepis	Prairie Dropseed
Stipa viridula (syn. Nassella viridula)	Green Needle Grass

ZONE 2 WET PRAIRIE SEED MIX

Forbs

Description	
Anemone canadensis	Canada Anemone
Apocynum sibiricum	Clasping Dogbane
Asclepias incarnata	Swamp Milkweed
Aster puniceus	Swamp Aster
Dalea purpurea	Purple Prairie Clover
Desmodium canadense	Showy Tick Trefoil
Doellingeria umbellata	Flat-Topped Aster
Eupatorium maculatum	Joe Pye Weed
Eupatorium perfoliatum	Boneset
Euthamia graminifolia	Grass-leaved Goldenrod
Galium boreale	Northern Bedstraw
Helenium autumnale	Sneezeweed
Helianthus grosseserratus	Saw-tooth Sunflower
Lathyrus venosus	Veiny Pea
Liatris ligulistylis	Meadow Blazing Star
Liatris pycnostachya	Prairie Blazing Star
Lobelia siphilitica	Great Blue Lobelia
Lysimachia quadriflora	Prairie Loosestrife
Mimulus ringens	Monkey Flower
Pycnanthemum virginianum	Mountain Mint
Solidago gigantea	Late Goldenrod
Thalictrum dasycarpum	Purple Meadow Rue

Verbena hastata	Blue Vervain
Vernonia fasciculata	Common Ironweed
Veronicastrum virginicum	Culver's Root
Zizia aurea	Golden Alexanders
GRASSES, SEDGES & RUSHES	
Description	
Agrostis scabra	Ticklegrass
Andropogon gerardii	Big Blustem
Bromus ciliatus	Fringed Brome
Bromus kalmii	Prairie Brome
Calamagrostis canadensis	Blue Joint Grass
Calamagrostis stricta	Northern reedgrass
Carex buxbaumii *	Buxbaum's Sedge
Carex pellita *	Wooly Sedge
Carex praegracilis	Freeway Sedge
Carex sartwellii *	Sartwell's Sedge
Carex stricta	Upright Sedge
Carex vulpinoidea	Fox Sedge
Deschamsia cespitosa	Tufted Hairgrass
Elymus trachycaulus	Slender Wheatgrass
Elymus virginicus	Virginia Wild Rye
Glyceria grandis	Reed Manna Grass
Glyceria striata	Fowl Manna Grass
Leymus triticoides	Beardgrass Wild Rye
Muhlenbergia glomerata	Marsh Muhly
Muhlenbergia richardsonis	Mat Muhly

Panicum virgatum	Switchgrass
Pascopyrum smithii	Western Wheatgrass
Poa palustris	Fowl Bluegrass
Schizachyrium scoparium	Little Blustem
Scirpus atroviren	Green Bulrush
Scirpus cyperinus	Woolgrass
Sorghastrum nutans	Indian Grass
Spartina pectinata	Prairie Cordgrass
Sporobolus heterolepis	Prairie Dropseed
Stipa viridula (syn. Nassella viridula)	Green Needle Grass

* Indicates speices that are highly desired.

ZONE 3 WET MEADOW SEED MIX

Forbs

Description	
Asclepias incarnata	Swamp Milkweed
Aster puniceus	Swamp Aster
Boltonia asteroides	False Aster
Doellingeria umbellata	Flat-topped Aster
Epilobium glandulosum	Northern Willow Herb
Eupatorium maculatum	Joe Pye Weed
Eupatorium perfoliatum	Boneset
Euthamia graminifolia	Grass-leaved Goldenrod
Helenium autumnale	Sneezeweed
Helianthus grosseserratus	Saw-tooth Sunflower
Hypoxis hirsute	Yeollow Star Grass
Lobelia siphilitica	Great Blue Lobelia
Lycopus americanus	Water Horehound
Lysimachia ciliata	Fringed Loosestrife
Mentha arvensis	Wild Mint
Mimulus ringens	Monkey Flower
Pedicularis lanceolata	Marsh Betony

Pycnanthemum virginianum	Mountain Mint
Solidago gigantea	Late Goldenrod
Symphyotrichum lanceolatum	Panicled Aster
Thalictrum dasycarpum	Purple Meadow Rue
Verbena hastata	Blue Vervain
Vernonia fasciculata	Common Ironweed
Veronicastrum virginicum	Culver's Root
Zizia aurea	Golden Alexanders

GRASSES, SEDGES & RUSHES

Description	
Agrostis scabra	Ticklegrass
Andropogon gerardii	Big Blustem
Beckmannia syzigachne	American Sloughgrass
Bromus ciliatus	Fringed Brome
Bromus kalmii	Prairie Brome
Calamagrostis canadensis	Blue Joint Grass
Calamagrostis stricta	Northern reedgrass
Carex bebbii	Bebb's Sedge
Carex buxbaumii *	Buxbaum's Sedge
Carex comosa	Bottlebrush Sedge
Carex lasiocarpa	Woolyfruit Sedge
Carex pellita *	Wooly Sedge
Carex praegracilis *	Freeway Sedge
Carex sartwellii *	Sartwell's Sedge
Carex scoparia	Broom Sedge
Carex sprengelii	Sprengel's Sedge
Carex stipata	Awlfruit Sedge
Carex stricta *	Tussock Sedge
Carex vulpinoidea	Fox Sedge
Distichlis spicata	Inland Saltgrass
Elymus trachycaulus	Slender Wheatgrass
Elymus virginicus	Virginia Wild Rye
Glyceria grandis	Reed Manna Grass
Glyceria striata	Fowl Manna Grass
Hierochloe odorata	Sweetgrass
Hordeum jubatum	Foxtail Barley

Juncus tenuis	Path Rush
Leersia oryzoides	Rice Cutgrass
Leymus triticoides	Beardless Wild Rye
Muhlenbergia glomerata	Marsh Muhly
Muhlenbergia richardsonis	Mat Muhly
Panicum virgatum	Switchgrass
Poa palustris	Fowl Bluegrass
Scirpus atroviren	Green Bulrush
Scirpus cyperinus	Woolgrass
Scolochloa festucacea	Common Rivergrass
Sorghastrum nutans	Indian Grass
Spartina pectinata	Prairie Cordgrass

* Indicates the species that are highly desired.

ZONE 4 and 5 BOTTOM MIX

Forbs

Description	
Acorus americanus	Sweet Flag
Acorus calamus	Sweet Flag
Alisma trivale	Nothern Water Plantain
Asclepias incarnata	Swamp Milkweed
Bidens cernua	Nodding Bur Marigold
Epilobium glandulosum	Northern Willow Herb
Eupatorium maculatum	Joe Pye Weed
Impatiens capensis	Spotted Touch-me-not
Iris versicolor	Northern Blue Flag
Lycopus americanus	Water Horehound
Lysimachia ciliata	Fringed Loosestrife
Mentha arvensis	Wild Mint
Mimulus ringens	Monkey Flower
Penthorum sedoides	Ditch Stonecrop
Physostegia virginiana	Obedient Plant
Polygonum pensylvanicum	Pinkweed
Polygonum punctatum	Smartweed
Polygonum sagittatum	Tear Thumb
Rumex orbiculatus	Bitter Dock

Sagittaria latifolia	Common Arrowhead
Scuttelaria laterifolia	Mad-dog Skullcap
Sium suave	Tall Water Parsnip
Sparganium eurycarpum	Great Bur Reed
Stachys palustris homotricha	Woundwort
Teucrium canadense	Germander

GRASSES, SEDGES & RUSHES

Description	
Agrostis scabra	Ticklegrass
Andropogon gerardii	Big Blustem
Beckmannia syzigachne	American Sloughgrass
Bromus ciliatus	Fringed Brome
Calamagrostis canadensis	Blue Joint Grass
Carex aquatilis *	Water Sedge
Carex aurea	Golden Sedge
Carex bebbii *	Bebb's Sedge
Carex comosa	Bottlebrush Sedge
Carex lacustris *	Lake Sedge
Carex lasiocarpa *	Woolyfruit Sedge
Carex pellita *	Wooly Sedge
Carex praegracilis	Freeway Sedge
Carex sartwellii *	Sartwell's Sedge
Carex scoparia *	Broom Sedge
Carex stipata	Awlfruit Sedge
Carex stricta	Tussock Sedge
Carex utriculata *	Common Yellow Lake Sedge
Carex vulpinoidea	Fox Sedge
Distichlis spicata	Inland Saltgrass
Eleocharis obtusa	Blunt Spikerush
Eleocharis palustris	Common Spikerush
Elymus virginicus	Virginia Wild Rye
Glyceria grandis	Reed Manna Grass
Glyceria striata	Fowl Manna Grass
Hierochloe odorata	Sweetgrass
Hordeum jubatum	Foxtail Barley
Juncus balticus	Baltic Rush

Juncus effusus	Common Rush
Leersia oryzoides	Rice Cutgrass
Muhlenbergia glomerata	Marsh Muhly
Panicum virgatum	Switchgrass
Poa palustris	Fowl Bluegrass
Scirpus acutus	Hardstem Bulrush
Scirpus atroviren	Green Bulrush
Scirpus cyperinus	Woolgrass
Scirpus fluviatilis	River Bulrush
Scirpus pungens	Common Three-Square
Scirpus validus	Softstem Bulrush
Scolochloa festucacea	Common Rivergrass
Sorghastrum nutans	Indian Grass
Spartina pectinata	Prairie Cordgrass

* Indicates species that are highly desired.

D2: Forested Wetland Mitigation Plan
April 2016

Objectives

The forested wetland mitigation plan addresses the compensatory mitigation requirement for impacts to forested wetlands associated with the non-federal portion of the Fargo-Moorhead Metropolitan Area Flood Risk Management Project. The non-federal portion of the project has been determined to result in unavoidable impacts to 26 acres of forested wetlands. In the FEIS, the U.S. Army Corps of Engineers, St. Paul District committed to providing compensatory mitigation for these unavoidable impacts at a ratio of 2:1 or 52 acres. In response, this plan has been developed to provide at least that amount of restored, created, or enhanced forested wetland. In the event that the sites described in this plan result in an amount of forested wetland that exceeds the requirement in the Clean Water Act Section 404 permit, the excess amount may be applied to compensatory mitigation requirements associated with federal project features that will be constructed by the St. Paul District.

The three sites described in this plan are estimated to result in the restoration of approximately 80 acres of forested wetlands. The functions of the wetlands at the mitigation site will be greater than those of the impact sites because the site selection process has prioritized larger sites, sites adjacent to waterways, sites where wetland hydrology could be restored or improved, and sites that are adjacent to other forested or natural areas. In addition, buffers comprised of native vegetation are a component of the plan for each site to further improve wetland function. The mitigation site will be located in the Red River of the North watershed which is the same watershed where the impacts will occur.

Site Selection

Site selection for forested wetland mitigation sites was conducted using the following hierarchical process. First sites must be located within the Red River watershed with a preference for mitigation sites as close as possible to the impacts sites. Second, lands currently owned by the non-federal sponsors were evaluated, and screened using the following criteria:

(1) presence of hydric soils
(2) potential to restore wetland hydrology through diversion of surface flows, manipulation of outlets, or grading
(3) connectivity with other natural areas and degree of disturbance from adjacent land uses
(4) potential acreage of restored forested wetlands

Approximately twenty sites were screened based on the criteria and eight were assessed in the field. The identification and evaluation process resulted in the identification of three sites: the Maple River Site, the Pincher Site, and the Rush River Site. Each site is briefly described in the following paragraphs. Additional details on the sites and the plan for restoring forested wetlands is provided in the Baseline Information and Mitigation Work Plan sections of this document. The locations of the sites are shown on Figure 1 and Figure 2.

Maple River Site. The Maple River site is located near the intersection of County Road 20 and 26th Street NW (46°55'49.71"N, 96°57'10.81"W) in Cass County, North Dakota.

The site encompasses approximately 47 acres and would be located on the protected side of the diversion channel (figure 1).

Pincher Site. The Pincher Site is located adjacent to the Red River of the North south of the City of Oxbow in Cass County, North Dakota. The site is located east of the recently constructed oxbow levee adjacent to an existing floodplain forest. The site encompasses approximately 13 acres and would be located on the unprotected side of the Oxbow Hickson Bakke Levee (Figure 2).

Lower Rush River Site. The Lower Rush River site is an approximate 60 acre parcel located southeast of the intersection of County Road 22 and 105th Street N (46°57'43.30"N, 96°57'10.81"W). The site borders the west bank of the Lower Rush River along its southeastern edge for approximately 3,000 feet. The Rush River inlet to the diversion channel would be located immediately east of the site (figure 1).

Site Protection Instrument

The sites are currently owned by one of the local governments that collectively make up the local sponsors for the project. A conservation easement or other protective mechanism will be established for each mitigation site. The mechanism will prohibit incompatible uses at the site including plowing, vegetation removal, grading, grazing, mining, and others that would directly or indirectly reduce the quality and quantity of forested wetlands at each site. There has been some interest from the North Dakota Game and Fish Department in holding an easement or other protective mechanism once the site is constructed and the protection established/recorded.

Baseline Information

Maple River Site. The site is currently used in the production of agricultural row crops. Based on a review of air photographs, the site has been in agricultural use since at least 1990. The soils at the site consist of Fargo silty clay (I229A), Fargo-Nutley silty clays (I234A), Wahpeton silty clay (I248A), and Cashel silty clay (I293B). The Fargo silty clay and the Fargo-Nutley silty clays are hydric soils (although the Fargo-Nutley silty clays have non-hydric components). The other two map units at the site are predominantly non-hydric but do contain approximately 10% hydric components. The National Wetland Inventory does not identify any wetlands at the site. However, a wetland delineation was completed as part of the wetland determination for the diversion project and a few small areas were identified as wetlands.

The site is bordered on the south by the Maple River and a riparian area of varying widths between the agricultural fields and the Maple River. The east side of the site is bordered by a residential property containing a narrow wooded area along the field edge. The areas north and west are used for agricultural row crops.

There are three defined outlets along the southern edge of the site that allow water to drain from the agricultural field through the riparian buffer and into the Maple River. The outlets are associated with swales and collection areas at the site that display wet signatures on air photographs. The outlets appear to have been maintained or improved to improve drainage from the fields.

Pincher Site. The Pincher site was in use for agricultural row crops from at least 1990 until 2014 when a levee was constructed immediately west of the site and agricultural activities ceased. The site is currently dominated by cocklebur, box elder seedlings, and brome grass. The soils at the site consist of

Fargo silty clay (I235A), Cashel silty clay (I293B), and Sinai silty clay (1475B). The Fargo silty clay is a hydric soil (all components) while the other two map units are predominantly non-hydric but do contain hydric components (8-13%). The National Wetland Inventory does not identify any wetlands at the site. However, a wetland delineation was completed as part of the permitting process for the levee construction in 2014 and wetlands were mapped along two drainages that collected surface water runoff from the agricultural fields and funneled through outlets into the riparian area west of the site towards the Red River of the North. These wetlands are presumed to have been impacted by the levee construction and elimination of surface flows to this area.

The site is bordered on the south by a residential property, on the east and north by a floodplain forest adjacent to the Red River of the North, and to the west by the recently constructed levee.

As previously mentioned, there are two defined outlets along the eastern edge of the site that allow water to drain from the site towards the Red River of the North. The outlets are associated with swales and collection areas that existed in the agricultural field before the levee was constructed. The outlets appear to have been maintained or improved to improve drainage from the fields. Currently surface drainage from areas south and west enters the site through two surface ditches. The first follows the exterior toe of the levee and carries surface water directly into the site until the constructed ditch matches the natural slope of the land and the flow become diffuse. The second ditch is located along the southern boundary of the site and carries flow directly to the Red River of the North.

Lower Rush River Site. The site is currently used in the production of agricultural row crops. Based on a review of air photographs, the site has been in agricultural use since at least 1990. The soils at the site consist of Fargo silty clays (I229A and 1235A) and Fargo-Ryan silty clays (I241A). All of the mapped soil units at the site identified as hydric. The National Wetland Inventory does not identify any wetlands at the site. However, a wetland delineation was completed as part of the wetland determination for the diversion project and a few small areas were identified as wetlands. Only a portion of this site was delineated.

The site is bordered on the southeast by a berm along the Lower Rush River, on the north by County Road 22, and on the east by 105th Street N. Ditches along the roads that border the site convey water towards the Lower Rush River. Air photographs indicate that surface flows from the site carry water north through culverts under County Road 22 to an adjacent agricultural field. A culvert at the northeastern corner of the site allows water that collects at this location to enter the Lower Rush River.

Determination of Credits

The analyses in the FEIS indicated that forested wetland impacts would be mitigated at a ratio of 2:1. The total forested wetland impact for the diversion portion of the Project is 26 acres resulting in a mitigation requirement of 52 acres. Since the proposed activities at each of the mitigation sites involve measures that would generally be credited at least at a 2:1 ratio (restoration of a completely drained wetland and/or creation of a new wetland) the ratio established in the FEIS will be sufficient to offset the impacts consistent with NDRO guidance. Additional information regarding the mitigation method to be used and amount of credit provided for each site in the Mitigation Work Plan section of this document.

Mitigation Work Plan

Maple River Site. Forested wetlands will be restored at the site by blocking the three outlets that currently allow surface water to drain from the site towards the Maple River (additional investigations into the need for a low berm in the southeast corner of the site will also be conducted during more detailed design). Based on existing topography, wetland hydrology will be restored to approximately 34 acres of drained hydric soils by modifying the outlets from the fields. Minor grading and earth moving will occur as part of the outlet modification and to establish contours across the site that spread surface flows parallel to the river. Upland buffers composed of native species will be established around the restored wetlands.

Vegetation will be reestablished at the site by planting within the boundaries shown on Figure 1. Planting the site by direct seeding species that are readily available and planting bare-root seedlings of species that are not readily available has been found to be the most effective way to restore floodplain forest. The work would include woody debris removal, disking, herbicide treatment, and direct seeding with seeds of cottonwood (*Populus deltoids*), black willow (*Salix nigra*), green ash (*Fraxinus pennsylvanica*), hackberry (*Celtis occidentalis*), bur oak (*Quercus macrocarpa*), American elm (*Ulmus Americana),* silver maple (*Acer sacharinum*), black walnut (*Juglans nigra),* and American basswood (*Tilia americana*). If seeds for any of these tree species are not available, those tree species would be planted as bare-root seedlings. Monitoring would be conducted and additional seedlings would be planted if the tree density targets are not attained.

The following initial work would be conducted (for these sites some of this work has already been done or is ongoing):

1. Delineate tree planting areas to cover at least 80 percent of total area. The remaining 20 percent of the mitigation area would be allowed to grow in with native forbs, shrubs, trees and germinated from locally grown propagules. These areas of local vegetation would be interspersed between the tree planting areas.
2. Clear and grub the tree planting area and properly dispose of significant woody debris if necessary.
3. Treat the site with glyphosate after spring green-up and again in early fall.
4. The following spring, disc the site to expose mineral soil and treat with the pre-emergent herbicide Oust or other approved herbicide.
5. Direct seed the entire tree planting acreage with cottonwood (Populus deltoids), American elm (*Ulmus americana*), silver maple (*Acer sacharinum*), black willow (Salix nigra), green ash (Fraxinus pennsylvanica), hackberry (Celtis occidentalis), bur oak (Quercus macrocarpa), quaking aspen (*Populus tremuloides*), black walnut (*Juglans nigra),* and American basswood (Tilia americana). The site should then be lightly dragged to ensure good soil/seed contact. If large quantities of seed from any of the selected species are not available, the Corps would plant these species as bare-root seedlings. The bare-root seedlings would be planted by machine, and seedlings would be planted in meandering rows to better imitate a natural forest.
6. Assuming good germination and growth, apply Oust XP or another approved and appropriate herbicide in the fall after the seedlings go dormant to help ensure that there would be minimal weed problems during the following growing season.
7. If the direct seeding is not successful per performance standards listed in this document, plant seedling trees using power auger or tractor mounted tree planter. Install grow-tubes to protect against deer and beaver browsing and weed barrier mats to limit weed competition. Water the

planted trees at planting and three more times within the next month if rainfall is less than 1 inch each week.

8. Monitor tree survival and composition at 10 years. Replant as needed to attain target average of 300 trees per acre over the planted area with at least 10 percent hackberry and bur oak at 10 years after the initial planting.
9. If necessary, remove and properly dispose of the grow tubes when the trees reach 8 feet tall and more than 1 inch DBH.

Lower Rush River Site. Forested wetlands will be restored at the site by blocking the two outlets that currently allow surface water to drain from the site towards the north. Based on existing topography, wetland hydrology will be restored to approximately 43 acres of drained hydric soils by modifying the outlets from the fields. Minor grading and earth moving will occur as part of the outlet modification and to establish contours across the site that spread surface flows parallel to the diversion channel.

The methods for planting will be the same as those described for the Maple River site.

Pincher Site. Surface hydrology at the Pincher Site was altered as a result of the construction of the Oxbow levee project. Forested wetlands will be restored at the site by blocking two to three outlets that currently allow surface water to drain from the site towards the Red River (additional investigations of the need to plug an additional outlet to the north of the site will also be conducted during more detailed design). Based on existing topography, wetland hydrology will be restored to approximately 4 acres of drained hydric soils by modifying the outlets from the area. Upland buffers composed of native species is already established around the majority of the restored wetlands.

Forested wetlands will be restored adjacent to an existing floodplain forest (Figure 2). This area has not been farmed for one season and is already regenerating naturally from propagules provided by the adjacent floodplain forest. The majority of the seedlings are box elder (*Acer negundo)*so the proposal for this site is to inner plant bare root stock of the following species; American elm (*Ulmus americana*), silver maple (*Acer sacharinum*), black willow (Salix nigra), green ash (*Fraxinus pennsylvanica*), hackberry (*Celtis occidentalis*), bur oak (*Quercus macrocarpa*), quaking aspen (*Populus tremuloides*), black walnut (*Juglans nigra),* and American basswood (*Tilia americana*). As well as cuttings of Eastern Cottonwood *(Populus deltoids)* and red-osier dogwood (*Cornus sericea).*

Maintenance Plan

After initial construction the mitigation sites will be monitored annually to assess the success in restoring and creating forested wetlands. Periodic mowing, burning, and spot treating with herbicide will be required to control the establishment of non-desirable species and increase the successful establishment of planted species. Once seeded, it is anticipated that native species will take approximately three to five years to become established under favorable growing conditions.

Other adaptive management measures may be employed to address vegetative or hydrologic concerns identified during and after the initial establishment period. Maintenance needs will be identified as part of the annual monitoring conducted to determine compliance with the mitigation performance standards for the site and as part of the periodic inspections conducted in accordance with the operation and maintenance plan for the project.

Performance Standards

The following performance standards have been established for the forested wetland mitigation sites:

1. There shall be an average of 300 native, non-invasive trees per acre with diameter at breast height (DBH) of 2 inches or more over 80 percent of the mitigation site within ten years of establishment of the site.

2. More than 50 percent of vegetative areal cover within the wetland communities of the mitigation site shall be composed of FAC, FACW or OBL species.

3. Hydrology shall consist of inundation by a few inches to 36 inches of water for a minimum of 14 consecutive days during the growing season under normal to wetter than normal conditions (70 percent of years based on most recent 30-year record of precipitation). Inundation shall be typically absent following the first 6 weeks of the growing season and the water table typically drops below 12 inches from the surface for the majority of the growing season in most years.

4. Upland buffers must have at least 75 percent areal cover of perennial species, but can have more than 25 percent vegetative areal cover by invasive and/or non-native species.

5. Control of invasive and/or non-native plant species shall be carried out for ten full growing seasons. Control shall consist of mowing, burning, disking, mulching, biocontrol and/or herbicide treatments as appropriate for the site. By the third growing season, any areas one-quarter acre in size or larger that have greater than 50 percent areal cover of invasive and/or non-native species shall be treated (e.g., herbicide) and/or cleared (e.g., disked) and then reseeded. At the end of the tenth growing season, the vegetative community shall not contain greater than twenty-five percent vegetative areal cover of invasive and/or non-native species including but not limited to: reed canary grass (*Phalaris arundinacea*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), smooth brome grass (*Bromus inermis*), giant ragweed (*Ambrosia trifida*), common ragweed (*Ambrosia artemisiifolia*), quack grass (*Elytrigia repens*), black locust (*Robinia pseudoacacia*), sweet clovers (*Melilotus alba* and *M. officinalis*), non-native honeysuckles (e.g., *Lonicera* x *bella*), and non-native buckthorns (*Rhamnus cathartica* and *R. frangula*). The mitigation site shall have no purple loosestrife (*Lythrum salicaria*) present at the end of the monitoring period.

Monitoring Requirements

Post-construction monitoring shall be conducted to determine the quality and amount of forested wetlands created as compensatory mitigation for the unavoidable impacts of the Project. The purpose of the monitoring is to provide information to determine if the site is successful in meeting its performance standards. The monitoring period for forested wetlands shall be ten years. This period may be shortened if the monitoring reports demonstrate that the mitigation site(s) has met its performance standard(s) in two consecutive reports and the regulatory agencies and the Corps of Engineers concur that additional monitoring is not required.

Monitoring reports shall be concise and effectively provide the information necessary to assess the status of the compensatory mitigation project. Monitoring shall commence the first full growing season following completion of construction (construction includes earth moving, excavation and other physical

work as well as planting and seeding). The first monitoring report shall be submitted on or before December 31st of the first monitoring year. Subsequent reports shall be submitted on or before December 31st for years three, five, seven, and ten (total of five reports).

Monitoring reports shall contain the following information and any additional information necessary to evaluate the performance of the mitigation site:

1. Name of party responsible for conducting the monitoring and the date(s) the inspection was conducted;
2. A brief paragraph describing the mitigation acreage and type of aquatic resources authorized to compensate for the aquatic impacts;
3. Written description of the location of the compensatory mitigation project including information to locate the site perimeter(s), and coordinates of the mitigation site (expressed as latitude, longitudes, UTMs, state plane coordinate system, etc.);
4. Dates the compensatory mitigation project commenced and/or was completed;
5. Short statement on whether the performance standards are being met;
6. Summary data, including photo documentation, to substantiate the success and/or potential challenges associated with the compensatory mitigation project;
7. Maps showing the location of the compensatory mitigation site relative to other landscape features, habitat types, locations of photographic reference points, transects, sampling data points, monitoring well locations, and/or other features pertinent to the mitigation plan;
8. A summary of the amounts and type of wetlands restored, enhanced, and created at the mitigation site identified by wetland plant community types based on Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed).
9. Dates of any recent corrective or maintenance activities conducted since the previous report submission;
10. Specific recommendations for any additional corrective or remedial actions.

The final monitoring report shall also include a wetland delineation completed in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region*.

Long-term Management Plan

As part of the Federal flood damage reduction project for the Fargo-Moorhead metropolitan area the forested wetland mitigation sites will be turned over to the non-federal Sponsor (the Diversion Authority) once construction of the project is completed. The non-federal sponsor would then assume responsibility for maintenance and management of the mitigation sites in accordance with the project partnering agreement. The agreement will be consistent with the goals and objectives for the site summarized in the FWMP.

Adaptive Management Plan

An adaptive management plan for compensatory mitigation sites was prepared by the U.S. Army Corps of Engineers, St. Paul District as part of the Final Feasibility Report and Environmental Impact Statement for the Fargo-Moorhead Metropolitan Area Flood Risk Management Project dated July 2011. The adaptive management plan was provided as Attachment 6 to that report.

Financial Assurance

A financial assurance is not proposed for these mitigation sites since it is part of a Federal project undertaken by the U.S. Army Corps of Engineers. The Corps will ensure that the mitigation site are constructed in accordance with the mitigation plan and meets the established performance standards.

D3: Mitigation Proposal for Aquatic Habitat Impacts
July 2016

Objectives

The Aquatic Habitat Mitigation Plan (AHMP) addresses the mitigation requirement for impacts to the aquatic habitat impacted from the federal portion and the non-federal portion of the project. The aquatic habitat impacts occur from channel abandonment associated with project features including; the Maple River and Sheyenne River aqueducts, and the Red River and Wild Rice River control structures. The structures will all be built "in the dry" with the rivers re-routed through them. The result of this is the loss of river channel habitat. The non-federal portion of the project includes impacts to approximately 10 acres of riverine habitat on the Maple River, and 8 acres of riverine habitat on the Sheyenne River. The federal portion of the project includes impacts to approximately 11 acres of riverine habitat on the Wild Rice River (North Dakota), and 14 acres of riverine habitat on the Red River. In the FEIS attachment 6, the U.S. Army Corps of Engineers, St. Paul District (USACE) committed to providing mitigation for these impacts.

As outlined in FEIS attachment 6, USACE must factor in habitat quality within its determination of mitigation needs. Habitat quality has been quantified through the use of Index of Biotic Integrity (IBI) scores. As outlined in attachment 6, habitat quantity and quality are combined to generate a quantitative "habitat unit" to estimate both the level of impact and level of mitigation.

Impacts to aquatic riverine habitat have been updated since the FEIS based on field data collection and more detailed project design information. These numbers will continue to be revised based on additional data collection and final project designs. Based on current information, the project would impact approximately 23 "habitat units" of aquatic riverine habitat. The new channels created leading into and out of project structures (i.e., water control structures and aqueducts) would create approximately 16 habitat units. This resulted in a mitigation need of approximately 7 habitat units.

Table 1. Habitat losses, gains and remaining mitigation needs for project impacts on each river within the study area.

River	Habitat Lost	Habitat Gained	Net Difference
Red (ND and MN)	7 Habitat Units (14 acres)	4.5 Habitat Units (9 acres);	2.5 Habitat Units
Maple (ND)	5 Habitat Units (10 acres)	3.5 Habitat Units (7 acres)	1.5 Habitat Units
Sheyenne (ND)	5.6 habitat units (8 acres)	4.2 Habitat Units (6 acres)	1.4 Habitat Units
Wild Rice (ND)	5.5 Habitat Units (11 acres)	4 Habitat Units (8 acres)	1.5 Habitat Units
Total:	23.1 Habitat Units	16.2 Habitat Units	6.9 Habitat Units

The mitigation project described in this plan will provide approximately 7.5 habitat units of aquatic river habitat, which is slightly larger than the required 7 habitat units that will be lost as a result of the project.

Site Selection

Site selection for aquatic habitat mitigation considered several factors. First, to the fullest extent practicable, sites must be located within the Red River watershed with a preference for mitigation sites as close as possible to the impacts sites. Second, all agency partners were included within the discussion and selection process for mitigation project(s). Third, although mitigation needs to be done within a watershed context, there was strong agency preference that mitigation be done within the State where the impact occurred. Because the majority of impacts to aquatic habitat would occur within North Dakota, and because remaining impacts within Minnesota would be on the Red River which is shared between Minnesota and North Dakota, the result was a strong agency preference for the majority of mitigation to be within North Dakota.

Measures considered for aquatic habitat mitigation include performing full stream restoration, stream improvement via riparian corridor restoration, and construction of fish passage. Stream and riparian corridor restoration are direct, site-specific tools that offset project impacts by restoring a specific amount of habitat to replace a specific amount of habitat lost or impaired. It is the best mitigation option in terms of measuring specific habitat replacement, and monitoring to evaluate success of the mitigation. Conversely, fish passage provides benefits to the aquatic community by restoring migratory pathways that are otherwise limited. Benefits can be significant and substantial. However, it can be more difficult to identify exactly the amount of improved fish passage needed to offset footprint impacts. It also may be more difficult to evaluate whether the mitigation is completely offsetting the identified impact, although monitoring how well fish can navigate through a fish passage structure is possible.

Lengthy coordination with the state and federal natural resource agencies identified differences of opinion in the preferred methods for mitigation. Minnesota Department of Natural Resources (DNR) stated that site-specific mitigation was needed to offset habitat losses and measure success. North Dakota Game and Fish (NDGF) identified that fish passage was generally preferred for offsetting the aquatic impacts identified above. NDGF would support an approach that used both site-specific habitat restoration and fish passage for mitigation. Though stream restoration could provide definite, and more easily quantifiable aquatic habitat benefits, NDGF had significant concern whether an adequate number of sites could be identified for stream restoration. The USFWS stated that an approach that used multiple mitigation techniques (i.e., habitat restoration and fish passage) could be a reasonable approach to offsetting identified impacts.

During the process of selecting mitigation projects many locations were considered in detail and included locations on the Wild Rice, Maple, and Sheyenne Rivers in North Dakota; the Red and the Bois de Sioux rivers (ND and MN); and the Buffalo and Lower Ottertail Rivers, as well as Wolverton Creek in MN.

These sites were screened by the agency team including many field site assessments and agency discussions. After lengthy consideration USACE has elected to pursue the Bois de Sioux Re-meander project (south of Wahpeton, ND and Breckenridge, MN) for river aquatic habitat mitigation. This location would allow for river restoration via reconnect meanders abandoned during channelization.

The project would be within the watershed and located within both North Dakota and Minnesota. Additional details on the sites and a draft plan are described in the Baseline Information and Mitigation Work Plan sections of this document. The locations of the sites is shown on Figure 1.

Site Protection Instrument

The land is currently owned by 9 or more different individuals along the River Channel both in Minnesota and North Dakota. The lands necessary for the project would be acquired from willing land owners. The amount of land to be acquired will be determined after further study and site visits with the land owners. The land acquisition will prohibit incompatible uses at the site including plowing, vegetation removal, grading, grazing, mining, and others that would directly or indirectly reduce the quality of the aquatic habitat for the site.

Baseline Information

A proposal to restore aquatic habitat on the Bois de Sioux River located approximately 6 river miles south of Wahpeton, ND to compensate for impacts to lost riverine habitat caused by the project has been prepared by the Corps with input from state and federal agencies. This proposal includes restoring flow to historic meander bends that were cut off several years ago when this portion of the Bois de Sioux River was straightened. The preliminary goal is to return the base flow to approximately 13,000 feet of original river channel meanders with capacity for higher flows to continue through the existing channel.

Determination of Needs

As outlined above, the AHMP project would result in a total of about 23 habitat units (HUs) lost through footprint impacts. These numbers assumed no benefit from the constructed channel that passes through the structures. When taking into account the habitat that will be provided by the new channels, approximately 16 HU's, mitigation for the loss of seven aquatic habitat units is required.

Mitigation Work Plan

Bois de Sioux: Over 13,000 feet of riverine habitat will be restored by excavating sections of abandoned river channel to the elevation where the river will flow through these areas. Four oxbows have been selected for restoration with consideration of additional oxbows, if necessary (Figure 1). Activities would include earthwork to facilitate flow restoration in the historic channels. Excavation may be needed within the historic channels to account for any incision of the flood channel over time. The AHMP mitigation project would need to allow higher flood flows to flow through the existing flood channel. This is necessary to maintain the authorized purpose of the flood project. Grading and vegetative planting will also be done where necessary to help improve habitat.

Maintenance Plan

After initial construction the mitigation sites will be monitored to assess the success in restoring the flow to the original channels.

The project will be designed to minimize project maintenance. Adaptive management measures may be employed to address vegetative, aquatic or hydrologic concerns identified during and after the initial

establishment period. Maintenance needs will be identified as part of the annual monitoring conducted to determine compliance with the mitigation performance standards for the site and as part of the periodic inspections conducted in accordance with the operation and maintenance plan for the project.

Performance Standards

The following performance standards are being considered for the site:

1. All flow will be diverted into the old channel up until approximately 2 year event, at which time additional flow will pass over a low flow restoration structure and through the flood channel.

2. The mitigation project will generate the approximately seven habitat units necessary to offset project impacts. Mitigation effectiveness will be determined by an Index of Biotic Integrity score that will measure general habitat health of mitigation sites. This will be multiplied by the area of habitat created to generate the number of habitat units for the mitigation site.

Monitoring Requirements

Post-construction monitoring shall be conducted to determine the quality of the restored channels created as mitigation for the unavoidable impacts of the Project. The purpose of the monitoring is to provide information to determine if the site is successful in meeting its performance standards.

Monitoring reports shall be concise and effectively provide the information necessary to assess the status of the mitigation project. Monitoring would likely commence the first full growing season following completion of construction (construction includes earth moving, flow restoration, excavation and other physical work as well as planting and seeding).

Monitoring reports shall contain the following information and any additional information necessary to evaluate the performance of the mitigation site:

1. Name of party responsible for conducting the monitoring and the date(s) the inspection was conducted;
2. A brief paragraph describing the mitigation acreage and type of aquatic resources authorized to mitigate for the aquatic impacts;
3. Written description of the location of the mitigation project including information to locate the site perimeter(s), and coordinates of the mitigation site (expressed as latitude, longitudes, UTMs, state plane coordinate system, etc.);
4. Dates the mitigation project commenced and/or was completed;
5. Short statement on whether the performance standards are being met;
6. Summary data, including photo documentation, to substantiate the success and/or potential challenges associated with the mitigation project;
7. Maps showing the location of the mitigation site relative to other landscape features, habitat types, locations of photographic reference points, transects, sampling data points, and/or other features pertinent to the mitigation plan;
8. Dates of any recent corrective or maintenance activities conducted since the previous report submission;
9. Specific recommendations for any additional corrective or remedial actions.

Long-term Management Plan

As part of the Federal flood damage reduction project for the Fargo-Moorhead metropolitan area the biotic mitigation sites will be turned over to the non-federal Sponsor (the Diversion Authority) once construction of the project is completed. The non-federal sponsor would then assume responsibility for maintenance and management of the mitigation sites in accordance with the project partnering agreement. The agreement will be consistent with the goals and objectives for the site summarized in the FWMP.

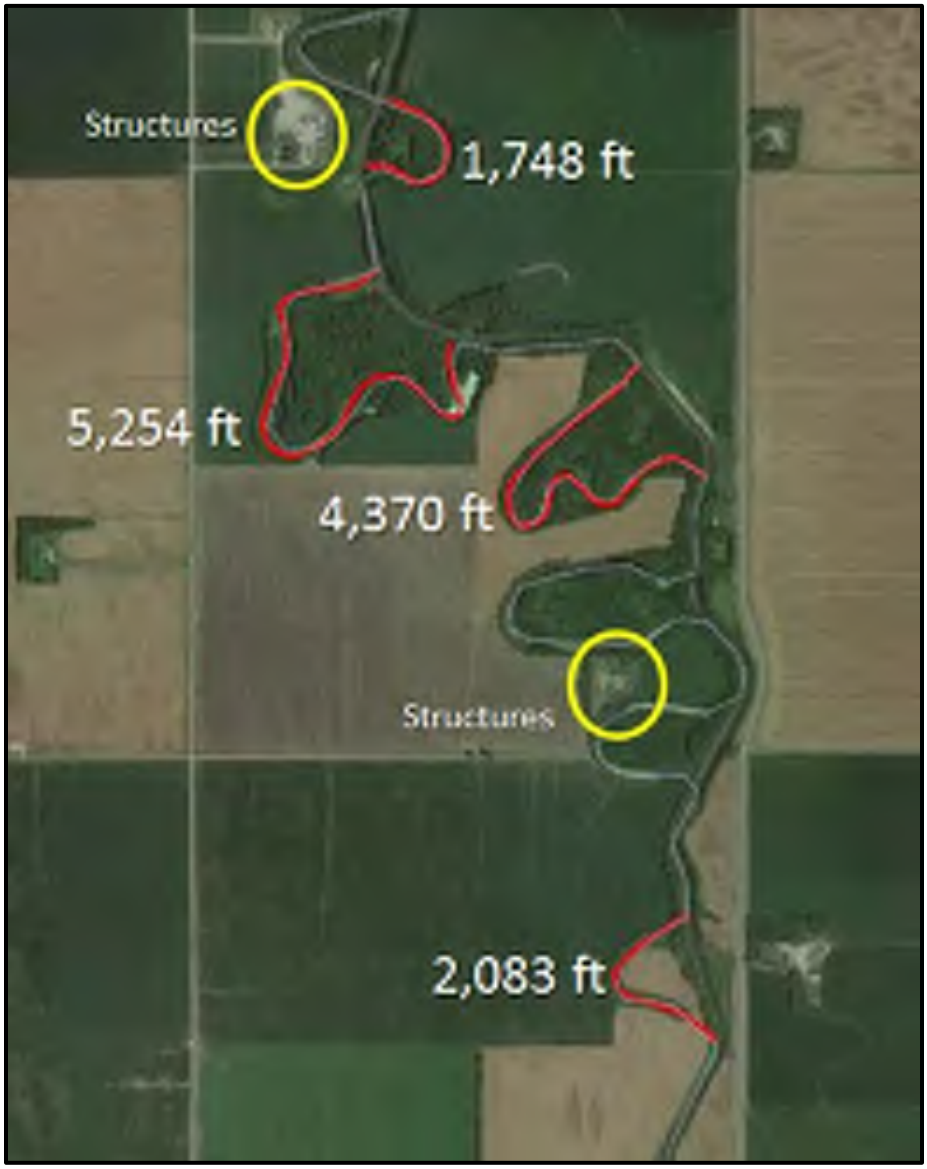
Adaptive Management Plan

An adaptive management plan for mitigation sites was prepared by the U.S. Army Corps of Engineers, St. Paul District as part of the Final Feasibility Report and Environmental Impact Statement for the Fargo-Moorhead Metropolitan Area Flood Risk Management Project dated July 2011. The adaptive management plan was provided as Attachment 6 to that report.

Financial Assurance

This mitigation is part of the broader Federal project undertaken by the U.S. Army Corps of Engineers. The Corps will ensure that the mitigation site is constructed in accordance with the mitigation plan and assess whether the mitigation is meeting the established performance standards.

Figure 1. Proposed re-meander on the Bois de Sioux River south of Wahpeton, ND and Breckenridge, MN.



FARGO-MOORHEAD AREA FLOOD DIVERSION TASK FORCE: FINAL REPORT

January 18, 2018

I. Fargo-Moorhead Area Flood Diversion Task Force Summary

North Dakota Governor Doug Burgum and Minnesota Governor Mark Dayton created a joint Task Force to propose the framework for flood risk management for the Fargo-Moorhead region. The Governors served as the Task Force Co-Chairs. Each Governor appointed eight members seeking to represent the range of perspectives in the region. Over a series of five meetings between October 23 and December 11, 2017, the Task Force's role was to discuss flood control options and make recommendations. These recommendations are available for consideration by the Diversion Authority for a future permit application for flood control.

Purpose

The purpose of the Task Force was to develop design principles and concept-level engineering solutions to achieve balanced flood risk management for the Fargo-Moorhead region, including upstream- and downstream communities and properties.

Key Parameters

At the meeting held on October 4th between Governor Burgum and Governor Dayton, two key parameters for the Task Force's work were identified and agreed to:

1. Find solutions within the parameters established by applicable Minnesota, North Dakota and local law.
2. Maintain federal authorization and associated funding for permanent flood protection, unless more expedient and low-cost options are presented that provide protection for a one percent chance flood (i.e., 100-year flood as defined by the Task Force) accreditation by FEMA under the National Flood Insurance Program.

Task Force Members

Minnesota Task Force Members:

- Del Rae Williams, Mayor, Moorhead.
- Heidi Durand, City Council Member, Moorhead.
- Joel Paulsen, City Council Member, Moorhead.
- Jenny Mongeau, Clay County Commissioner.
- Tim Fox, Former Wilkin County Attorney.
- Mark Anderson, Treasurer, Buffalo-Red River Watershed District.
- Curt Johannsen, Mayor, Hendrum.
- Steve Jacobson, Norman County Commissioner.

North Dakota Task Force Members:

- Jason Benson, Cass County Engineer.
- Rob Bergan, Fargo Business Leader and Entrepreneur.
- Nathan Berseth, Richland County Commissioner.
- Bernie Dardis, Board Chair, Greater North Dakota Chamber of Commerce.
- Craig Hertsgaard, Farmer, Richland County.
- Tami Norgard, Vogel Law Firm.
- John Strand, Fargo City Commissioner.
- Ken Vein, City Council Member, Grand Forks

Technical Advisory Committee

The Task Force created a Technical Advisory Committee that included engineers and staff from the Diversion Authority and the Minnesota Department of Natural Resources. This Technical Advisory Committee presented the Task Force with engineering options to address concerns about project impacts in each state and county, maintaining the flood plain, and cost considerations.

Technical Advisory Committee Members

- Bob Zimmerman, City Engineer, Moorhead.
- Nathan Boerboom, City Engineer, Fargo.
- Greg Thielman, Principal/Senior Project Manager, Houston Moore Engineering Group.
- Suzanne Jiwani, Floodplain Engineer, MN Department of Natural Resources.
- Jill Townley, Principal Planner, Environmental Review.
- Kent Lokkesmoe, Administrator of the Management Resources Bureau, DNR.

Task Force Findings

The Task Force focused on variables related to conceptual engineering designs. Early on, the Task Force came to consensus on the level of protection the project should provide, with consideration for the need to be able to fight bigger floods. While formal consensus was not reached on other variables, the Technical Advisory Committee made recommendations on a number of variables that the Task Force discussed. There were more controversial variables that the Technical Committee did not come to agreement on, and the Task Force asked for further technical review. The key variables discussed include:

1. **What is the level of protection?**
   Task Force consensus: 100 year protection at 33,000 cfs

2. **Should there be a western tie-back?**
   Technical Committee Recommendation: The Tech Committee recommends this, as it reduces upstream impacts. No Task Force members expressed opposition to the western tie-back.

3. **Should there be an eastern tie-back?**

Technical Committee Recommendation: The Tech Committee recommends this, as it reduces upstream impacts. No Task Force members expressed opposition to the eastern tie-back, though at least one member expressly reserved judgment regarding the correct alignment.

4. **How much water runs through town?**
   Technical Committee Recommendation: Design for a river stage of 37 feet through town. Note: The Army Corps said they would be able to certify 100-year protection for a system that runs 37 feet through town and also said this approach would likely work for the current authorization. Over the past 100 years, a river stage of 37 feet through Fargo and Moorhead was exceeded for 28 days.

5. **Is there northern storage in the downstream area?**
   Technical Committee Recommendation: The Tech Committee was neutral. It would store water in the northwest part of the project area; however, it reduces the staging area elevations 0.03 feet. It does maintain natural floodplain acres, which is important overall for Minnesota permittability.

6. **Is there a change in the embankment structure?**
   For the purpose of identifying a potential alignment recommendation, the Technical Committee considered different options for the dam alignment--- 7A, B and C were presented to the Task Force. It was discussed how 7A would likely not be permittable by the Minnesota DNR. The Army Corps of Engineers had concerns with 7B and maintaining federal authorization. Option 7C maintained more floodplain than 7A and less than 7B, DNR said that 7C would likely need some additional storage added to be permittable. The combining of the options to maximize storage was suggested by some Task Force members and DNR. Combinations of 7A, 7B, and 7C as well as 7C alone were discussed by the Task Force.

7. **Is there an increase in downstream water levels?**
   This is an issue related to dam operation, rather than constructed project features. The Technical Committee considered an operational approach that would allow up to six inches of stage increase downstream. This would occur at Climax, MN because of a narrowing of the river. A six-inch stage rise at Climax would translate to less than 0.5 inches at the Canadian border. The Task Force Charter called for more balanced impacts upstream and downstream, which implies more flow to the downstream area. However, the impact on water levels at the Canadian border and other downstream communities were significant concerns for several Task Force members. Further determination of this issue can be considered in the operating plan for the dam.

II. Technical Advisory Group Final Report

Background:

The Technical Advisory Group (TAG) was created as an advisory group to the Fargo-Moorhead Area Flood Diversion Task Force to assess components and alternatives and provide technical guidance to the Task Force. Members of the TAG include:

Kent Lokkesmoe - DNR Manager;
Suzanne Jiwani – DNR Floodplain Engineer
Jill Townley – DNR EIS Manager
Bob Zimmerman - Moorhead City Engineer
Nathan Boerboom - Fargo Division Engineer
Gregg Thielman - Diversion Authority Engineer

The TAG held public meetings on November 14, 2017 and November 28, 2017. As part of these meetings the TAG:

- Defined criteria to evaluate alternatives and components. This includes the following key criteria (not in particular order):
    - Satisfy Task Force Charter
    - Meet Laws and Ordinances
    - Minimize Residual Risk
    - Reduce Floodplain Impacts
    - Reduce Environmental Effects
    - Limit Impacts to Structures
    - Resilience/Robustness of Design
    - Cost and Engineering Feasibility
    - Upstream and Downstream Impacts
    - Impacts at the U.S./Canadian Border

- Screened components and alternatives for further evaluation. Components that were considered include:
    - Distributed Storage Alternative
    - Western Tie-back Levee
    - Additional Flows Through Town (River Stage (RS) 35', 37', 38', and 39')
    - Levee-only Alternative
    - Change Location of Dam/Southern Embankment
    - Northern Storage Option
    - Allowing Increased Downstream Impacts (up to 6 inches maximum)
    - Wild Rice River-only Diversion
    - Eastern Tie-back change
- Reviewed technical data and developed information for presentation to the Task Force at their November 29, 2017 and December 11, 2017 meetings.

The Task Force did not discuss funding sources or other financing opportunities for any consensual or majority recommendations.
Meeting notes, and guidance documents developed by the TAG are included in ***Appendix A***.

The Task Force directed the TAG to use full period of record hydrology for its analysis. Based on this direction, the analysis uses a 1-percent annual chance (100-year) discharge of 33,000 cubic feet per second (cfs) at the USGS Fargo stream gage.

November 29, 2017 Task Force Meeting:

The TAG presentation, titled "Component Analysis" as well as technical data presented at the November 29, 2017 Task Force meeting are included in ***Appendix B***. Following is a summary of project components that were developed and presented by the TAG:

- Western Tie-back Levee – This component shifts the Limited Service Spillway for the dam/southern embankment to the west along an existing natural ridge. This reduces the staging elevation and utilizes more storage in North Dakota. It was included in components 1, 3, 4, and 5 that were presented.

- Consideration of Distributed Storage – It is recognized that Distributed Storage provides overall basin-wide benefit, but due to the implementation schedule and need for in-place storage for potentially reducing the 100-year discharge for accreditation purposes, this alternative was not analyzed as part of any components or alternatives by the TAG. To the extent that distributed storage (owned by a public body) is constructed and operational prior to completion of the Fargo-Moorhead project, the resulting changes in hydrology could be incorporated into the Letter of Map Revision (LOMR) for the Fargo-Moorhead project. Distributed storage completed after approval of the LOMR for the Fargo-Moorhead project would serve to increase the level of risk reduction (beyond a 100-year event).

- Components #1a-1d - Additional Flows Through Town – The TAG presented information on the impacts of increasing the flow through town from RS35' to RS37', RS38', and RS39'. Results were presented using the proposed project alignment.

- Component #2 – Levees Only – The TAG presented a conceptual ring levee plan that could potentially achieve FEMA Accreditation and protect the communities of Fargo and Moorhead.

- Components #3a-3c – Dam/Southern Embankment Alignments – The TAG presented 3 conceptual revised alignments for the southern embankment/dam. These include the North of the Wild Rice River (3a), Northern Alignment Alternative (3b) and Modified Storage Area 1 (3c) alignments.

- Component #4 – Northern Storage Option – The TAG presented a component that would increase flows into the flood damage reduction area through the Sheyenne and Maple River

Aqueducts. This would reduce the amount of lost floodplain storage in the northwest project area.

- Component #5 – Change Operation Plan to allow up to 6 inches of Downstream Impacts – The TAG presented a component that would change the project operation to allow up to a maximum of 6 inches of impact downstream from the project.

- Component #6 – Wild Rice River Diversion with Levees (no dam) – The TAG evaluated a component that would divert the Wild Rice River through the proposed project diversion channel and not divert water from the Red River or include a dam/southern embankment to mitigate impacts. This component would result in downstream impacts in excess of 1.5 feet in some areas along the Red River.

During the November 29, 2017 Task Force meeting, the Task Force directed the TAG to further evaluate components and bring information back to the December 11, 2017 Task Force meeting as follows:

- Include the Western Tie-back levee in all options
- Distributed Storage is part of a long-term strategy and will not be included in the current analysis
- Develop 3 alignment options for consideration
- Include results for RS37', RS38', and RS39'
- Include option that allows up to 6 inches of downstream impacts

Additional criteria the TAG was asked to consider in developing alternatives include:

- Strive for equity in impacts – ND/MN
- Minimize acres removed from the floodplain
- Minimize newly impacted acreage and structures
- Consider economics – cost increases and reductions

December 11, 2017 Task Force Meeting:

The TAG presentation, titled "Option Analysis" as well as technical data presented at the December 11, 2017 Task Force meeting are included in ***Appendix C***. Following is a summary of project components that were developed by the TAG and presented:

- Western Tie-back Levee – As noted above, this component shifts the Limited Service Spillway for the dam/southern embankment to the west along an existing natural ridge.
    - *This component was recommended by TAG and included in all of the options that were presented.*

- Eastern Tie-back – The proposed project eastern tie-back for the dam/southern embankment extends to existing high ground near Clay County Highway 11 between Sections 7 and 8 of Alliance Township in Clay County, MN. This component turns the eastern tie-back south in Section 2 of Holy Cross Township, Clay County and extends south

for approximately 5.5 miles and ties into existing high ground in Section 36 of Holy Cross Township near Clay County Highway 50.

- *This component reduces the acreage of newly impacted floodplain in Minnesota and was recommended by TAG. It was included in all of the options that were presented.*

- Northern Storage/Diversion Channel Alignment – In an attempt to lower the staging area elevation and have more balanced impacts, the Task Force recommended storing more water in the northwest portion of the flood damage reduction area. Instead of increasing the size of the aqueducts to pass more water into the lower Sheyenne and Maple Rivers (which would be very costly), changing the diversion alignment was evaluated. This change would have the potential to preserve more existing floodplain. An alignment change that shifts the project east between the BNSF Prosper Subdivision rail line and Interstate 29 was considered and presented. This shift preserves approximately 1800 acres of existing floodplain, but only reduces the 100-year elevation in the staging area by 0.03 feet. Other options to shift the alignment further east were considered, but were not analyzed further due to existing residential developments and structures and the multiple river and roadway crossings in this area.
  - *The TAG was neutral on this component due to the limited reduction in the staging elevation it provided and it was not included in any of the options that were presented.*

- Additional Flows Through Town – The TAG presented information on the impacts of increasing the flow through town from RS35' to RS37', RS38', and RS39'. Results were presented using the proposed project alignment.
  - *The TAG recommended that a flow through town that results in a RS37' during the 100-year flood event be carried forward and RS37' was used for all of the options that were presented. The communities will have to construct additional protection to manage the additional flows through town associated with RS37'.*

- Allow Downstream Impacts up to 6 inches – The TAG evaluated and presented options for changing the project operation to allow up to a maximum of 6 inches of downstream impact to achieve a balance between upstream and downstream interests. The 6-inch maximum impact would occur on the Red River in the vicinity of the city of Climax, MN, where the floodplain is relatively narrow. Analysis was performed for Options 7A, 7B, and 7C and the change results in a maximum staging area reduction at the dam of 0.3' to 0.4', depending on the option. Concerns with this component include potential impacts extending beyond the U.S./Canadian border and potential downstream mitigation costs associated impacted residential structures and existing community flood protection systems. It may be possible to allow downstream impacts less than 6 inches without causing an impact across the U.S./Canadian border. This was not an analysis that TAG completed.
  - *The TAG identified this is a policy/permit decision that will be evaluated more going forward. This is an operational issue and does not directly impact design considerations.*

- Change Location of Dam/Southern Embankment – The TAG developed and evaluated 3 alignment options for the dam/southern embankment. These alignments all shift the dam north (from the proposed project alignment) and added storage in North Dakota. Option 7A is very similar to Component 3c that was presented at the November 29, 2017 Task Force meeting and shifts the alignment north to the west of Interstate 29 and adds

approximately 3,000 acres of storage. Option 7B (which includes the area that is part of Option 7A) shifts the alignment further north to the west of Interstate 29 and adds approximately 5,200 acres. Option 7C shifts the alignment further north both west and east of Interstate 29 and adds approximately 4,800 acres of storage. All three options reduce the staging area elevation; shift more floodplain into North Dakota; and reduce the area removed from the floodplain within the protected area. They also reduce the newly impacted floodplain acreages in Richland County, North Dakota and Wilkin County, Minnesota. Preliminary cost estimates associated with these options were also developed.

- *The TAG did not recommend an Option for changing the dam/southern embankment alignment.*

Issues Yet to be Resolved:

- Dam/Southern Embankment Location
  - Due to time constraints, the TAG was not able to evaluate other potential alignments other than 7A, 7B, and 7C.
  - Shifting the alignment north of the proposed project alignment, similar to the options presented by TAG, seemed to be acceptable to most Task Force members. The exact alignment of the dam would still need to be determined.
- Amount of storage in North Dakota
  - Increasing storage in North Dakota reduces the staging area elevations and reduces new inundation impacts in Minnesota. The exact proportion of new and/or total inundation impacts between North Dakota and Minnesota that would result in a permittable project was not specified. It seemed that most Task Force members were favorable to the reduced newly inundated acres in Richland and Wilkin Counties as shown by TAG in the presented options, as well as the improved equity of impacts between Minnesota and North Dakota.
- Project Permittability
  - The TAG's primary objective was to serve as a technical advisory group to the Task Force, and therefore, TAG did not provide any recommendations on alignment.
  - The TAG advised that 7A would likely not receive a Minnesota permit, but that 7B and 7C, or a combination thereof, might be more permittable.
  - Future permittability questions will be a discussion between the Diversion Authority and both the Minnesota DNR and North Dakota SWC.

III. Statements from Governors

Governor Dayton:

I want to thank our Task Force's Co-Chair, Governor Doug Burgum, for his excellent leadership throughout this process. We have forged a good working partnership, which will be important for this and other collaborative projects, involving our two states.

I also thank the Task Force Members for their tremendous work. Their dedication was the key to our successful completion. And I greatly appreciate the enormously important contributions made by Members of the Technical Advisory Committee, by North Dakota and Minnesota agency experts, and by our two staffs. This was a team effort all the way.

The many important considerations that were presented from a wide range of stakeholders and experts provide a framework for moving forward on flood risk management for the Fargo-Moorhead region. Just as important was the model we established for a truly inclusive, collaborative process, rather than its one-sided, adversarial predecessor.

Reliable and effective flood protection for the cities of Moorhead and Fargo and their surrounding regions is essential. It is a prerequisite for successful future economic growth, business expansion, job creation, and social vitality. Yet it cannot come at the excessive sacrifice of other people's lands, lives, and livelihoods. For a project of this magnitude and complexity, those considerations are also essential.

It would be naive to believe that such a re-routing of massive amounts of water throughout widely divergent climate conditions over the next one hundred years and beyond could avoid any negative impacts on someone. That is why it is so critical to have the different stakeholders represented in this public process. For Minnesota, that would mean representation on the Diversion Authority from the areas both north and south of Fargo-Moorhead, in addition to the Members from those two cities. For the sake of continuity, it would be most desirable to add to the Authority Board individuals, who have served on this Task Force.

The project that was previously submitted to the Minnesota Department of Natural Resources did not meet our state's laws and regulations. Minnesota is committed to helping identify a solution, but major changes must be made to the proposed project.

I am hopeful that the Task Force's work has provided guidelines for the Authority's re-fashioning of its previous proposal to meet those laws and regulations. I emphasize that the necessary approvals will be decided by the Minnesota DNR, in accordance with those requirements and without interference by myself or anyone else. The active participation on the Task Force by the DNR's Commissioner and technical experts should not be construed as predetermining their permitting decisions.

There are other critical components of the project, which were not made known to the Task Force. Most important is the just compensation for any losses, temporary or permanent, suffered by any landowner, business, or other entity, resulting from the project. Committing publicly that fair compensation will be provided without delays or difficulties, is, in my view, absolutely necessary

before the project proceeds. Also needed to be made public is a detailed budget, for both the capital investments and the annual operating expenditures, the anticipated sources and amounts of funds, and the intended fiscal and operating authorities.

The Diversion Authority now has the responsibility to take all of these views and recommendations and combine them into a permittable application to the Minnesota DNR. I stand ready to work with my colleague, Governor Burgum, on other matters regarding this important project.

Governor Burgum:

Reviving the stalled effort to provide permanent flood protection for the greater Fargo-Moorhead area has been an exercise in the art of the possible. I extend my gratitude to Governor Dayton, task force members, the technical advisory group, Minnesota and North Dakota regulatory agencies, and the engaged citizens who made this public process so productive.

We put collaboration ahead of litigation and gathered informed and passionate perspectives from all sides around the same table. We explored a variety of concepts to provide regional protection and, through the process of elimination, made notable strides in identifying approaches that could ensure permanent protection in a cost-effective manner.

Still, much work remains with needed additional collaboration between the Diversion Authority, Minnesota DNR, Army Corps of Engineers and Richland-Wilkin JPA. As stated at the convening meeting, we must develop a project that is permittable under North Dakota and Minnesota law.

It remains clear that a diversion channel with control structures is the only economically viable solution that will provide certifiable protection for citizens, relieving thousands of ND and MN homeowners of the need to purchase flood insurance and allow the region to fight floods beyond a 100-year event.

The need for permanent flood protection is well understood. A solution has been nearly a decade in the making; and now, protection can and must be completed in an expedited fashion. We cannot afford to risk another event like the devastating 1997 Grand Forks-East Grand Forks flood. The Fargo-Moorhead-West Fargo greater metro is the region's largest economic engine – and must be protected from a catastrophic flood event.

We are deeply grateful for the dedicated engagement from all parties involved to move the conversation closer to resolution. My office will continue to work in partnership with Governor Dayton toward finalizing a permittable project, and I commend him for his commitment and engagement throughout this process and his dedication to finding a solution.

IV. Task Force Member Statements

Each Task Force member was afforded the opportunity to submit a statement after the final meeting of the Task Force on December 11, 2017. The following statements have been submitted directly from Task Force members. These statements are published "as is" and have not been reviewed for factual accuracy, spelling or grammar. They represent the opinions of the individual Task Force members and do not represent the views of the governors' offices, the Task Force as a whole, or the entities referenced therein.

Minnesota Representatives:

Mark Anderson- Treasurer, Buffalo-Red River Watershed District

I think that the Task Force should be looked at as a good starting point. Fargo and the Diversion Authority need to embrace a process to achieve permanent flood protection for Fargo-Moorhead. This process has to involve the people and agencies that will be affected by any project. The agencies, government entities, and people that should be at the table during the development process, are: the Minnesota DNR, the Minnesota DOT, Burlington Northern Santé Fe Railroad, Buffalo-Red River Watershed District, Holy Cross Township, Village of Comstock, and the downstream and upstream concerns of the homeowners and landowners affected by the project. This process will help identify problems at the beginning, not at the end. Some problems that have not been adequately addressed are flowage easements, land values, the raising of Trunk Highway No. 75 and County Road No. 2, and raising of the Burlington Northern Santé Fe Railroad tracks. The proposed eastern tieback levy also has some problems regarding local drainage. If a project of this magnitude is to succeed, it must follow all current laws and procedures. I am confident that the State of Minnesota and the Minnesota DNR will have the Diversion Authority comply with all the applicable laws and rules that the citizens of Minnesota must comply with. Thank you.

Heidi Durand- City Council Member, Moorhead

The intent of this report is to express the continued concerns upon the conclusion of the work done by the taskforce. The group of people who will be responsible for creating a flood protection project will need to assure the impacted communities by proving it is the least impactful, the most fair, follows moral and ethical principles; meets the basic needs of the community; and follows state and local laws.

There is no question the Fargo-Moorhead and surrounding communities are in need of permanent flood protection. Without a doubt, floodwaters have affected everyone in this community in some way. Everyone has a flood story to share. The need for protection is not in question. It is the manner in which protection is achieved that continues to be in question. Who pays and how much? Who is inundated and who is protected? What level of protection is wanted and what is needed? What is fair mitigation? What is a balance of impacts?

It is my strong belief that you cannot displace your water problem upon someone who has never had the problem; and those who benefit the most from a project must assume the most impacts associated with the project. Elected officials have an obligation to everyone impacted by a project in which their municipality is involved. If the city of Moorhead is involved in a project that has negative impacts for people outside the city's boundaries, the councilmembers are still obligated to think about those people and their well-being in decision-making. The notion that Moorhead should not "care" about the concerns of people in Clay or Wilkin, Cass or Richland counties is wrong.

The following is a list of remaining concerns and questions I have regarding the purpose and parameters of the taskforce and the key variables identified in the taskforce summary.

1. The purpose of the taskforce was to develop design principles and concept-level engineering solutions to achieve balanced flood risk management for the Fargo Moorhead region.
    a. My continuing question is if Cass County is expected to receive 80-90 percent of the benefit of the project should they not assume 80-90 percent of the impacts? Those involved with the project are quick to point out that North Dakota and Cass County are assuming 90 percent of the financial costs but "impacts" include more things than just dollars. Impacts should include inundation and dedicated flood plain preservation as well.
2. Two key parameters for the taskforce's work include solutions that were within the parameters of Minnesota, North Dakota, and local law; and that maintained federal authorization.
    a. Maintaining federal authorization restricted the taskforce's ability to develop alternatives. Every option that may have resulted in lower costs or less impacts was shot down before it even had a chance to be discussed. Critics were always quick to assert, "It could result in a change that would jeopardize federal authorization." This parameter held back discussions and was detrimental to the work.
3. Key variables of concern:
    a. The eastern tieback was presented and many agreed it was worth more studying. However, there are consequences that were not thoroughly discussed or presented. Perhaps a better solution would be to use an existing feature, such as highway 75, which could also function as a tieback.

b. Northern storage was briefly discussed and many people favored studying it further. The only option presented appeared to be a sliver of what could be pulled in for additional storage. We heard repeatedly that floodplain preservation was the best way to fight floods. This is an opportunity to do just that and must be a part of any future project.
c. More drastic changes in the embankment (high hazard dam) need to be explored. This is where the operational variable and the high hazard dam are connected. We were often told the dam was necessary to reduce the downstream impacts. If the State of North Dakota will follow the State of Minnesota's statutes regarding downstream impacts like they said they would, the height of the high dam could be reduced or perhaps even eliminated. The taskforce received information on mitigation work done in Manitoba. We were told that people "learn to live with the water" and rural homesteads are all ring-diked. If it works for Manitoba, perhaps it could work in the Red River Valley as well and mitigate any downstream impacts.

4. The use of the phrase "newly impacted structures." I repeatedly expressed my concern with this notion of identifying areas as "newly impacted." It is my belief this phrase was misleading and used inaccurately. For example, if a structure never had protection to begin with it, but changes to the plan would no longer benefit from the project, it should not be considered "newly impacted." This catchphrase was used to steer conversations away from several flood plain preservation options.

At the end of the last taskforce meeting, I left doubting there were enough changes or modifications made that would result in a permitable project. Many members tried to reiterate this point and make it clear that the current plan violates Minnesota law and cannot be permitted. However, it did not seem to matter to the handful who continued to resist any major changes.

The lack of changes in the dam structure/alignment and the Minnesota impacts left largely untouched leave us where we started. Despite the DNR's willingness to assist well-intended individuals who came to the table ready to work toward a project that could gain wider support, meet the needs of the communities, and be permitable, the refusal by some to look at major changes has done nothing but solidify the demise of the project. The DNR cannot "change their mind" and permit this project without jeopardizing their credibility. After all, who will bother to wait for a permit after witnessing the Diversion Authority do as they wish without obtaining necessary permits?

Tim Fox- Former Wilkin County Attorney

The Task Force received several presentations of varying relevance. Presentations by the Diversion Authority and Army Corps were intended to persuade the Task Force that the current project should proceed without change. It was not until the final meeting that a realistic effort was made to begin the process of addressing Federal and State laws intended to preserve existing floodplains. The

crux of the dispute is the transfer of floodplain impacts either down stream or upstream. The current plan, as confirmed by Governor Burgum when referencing the development of another subdivision near Davis High School, is to continue development in both south and northwest Fargo in areas that are currently in the floodplain and unfit for development.

There were several points of persuasion used throughout the presentation and discussion by project proponents that were misleading or made with faulty assumptions.

1) Base Line Comparisons: Using the current project, a project that has been denied a DNR permit, as a base line for comparisons or modifications was misleading and could only lead to false assumptions. One of the most obvious misleading assumptions was the designation of the unlawfully constructed inlet structure as a starting or ending point for the alignment of the diversion channel. The vast sums of money spent on Oxbow have clouded the clear benefit of maintaining the south Fargo floodplain while removing or greatly diminishing the impacts of Oxbow, Hickson and Bakke being in the staging area, and incidentally resulted in a $150 million savings. But for unlawful action of the DA, these saving should be a legitimate consideration. Numerous land acquisitions Northwest of Fargo have let to speculative land development in a floodplain area. The slate does need to be wiped clean in order to develop flood protection conforming with Federal and State legal and regulatory criteria. Floodplain Development or previous errors in judgment cannot be the guiding force in pursuing a permittable flood protection project for Fargo.

2) Army Corps Legal/Regulatory Comments: On several occasions the Corps was asked to provide legal or regulatory comments. The Corps refused, when asked, to acknowledge the regulatory authority of the State of Minnesota. By commencing construction of the project, not only once but twice, only to be stopped by the Federal Court, asking the Corps to provide comments about regulations or rules seemed strange at best. The Corps made responses in the nature of what made them comfortable or uncomfortable. If defying Minnesota law and proceeding into construction of a project while legal action was pending, did not make them uncomfortable, little deference should be given to any Corps opinion.

3) Newly Impacted Structures: The entire process of having data provided that tallied newly impacted or not impacted structures was clearly questionable. During the three most recent major floods, the entire area between Oxbow and South Fargo was nothing but a lake. How are there newly impacted structures in an area that is and has been a floodplain and regularly under water? When were these homes/schools built? Why does construction continue today in an area that should be preserved for floodplain to protect Fargo? On the opposite spectrum, there will be numerous farm sites and structures in South Clay and Cass Counties and North Richland and Wilkin Counties impacted by the dam and staging area. Many of the uncounted structures in these areas are considered already impacted though they have never flooded and are not in a floodplain. The distortions created by not recognizing truly impacted structures', to skew the support of the current project, will lead to years of

litigation when impacted property owners, flooded by a dam on the Red River, have never having been compensated or consented to a flowage easement. Again, this data as presented during the Task Force meetings seemed to be readily accepted by diversion proponents but carefully questioned by others. Conclusions of this nature should be closely scrutinized for accuracy.

4) Levee Only Option: At my suggestion this option was again reviewed. However, the conclusion as presented was in a single line of a report. The conclusion stated that it was rejected because of cost, suggesting the cost was $1.9 Billion. There were not any details as to how that cost was determined. Interestingly, that would be a savings over the current proposal and have far less negative impacts. It is another proposal with less negative impacts and reduced costs.

5) Minnesota Diversion: Little attention was given to the option, though it was the preferred option costing less with fewer negative impacts. Governor Dayton originally excluded it from consideration but later stepped back from that position. It should remain an option and be used as the baseline for comparisons of project configurations rather than the currently proposed project.

6) Final Day Options: The only real progress, though limited, occurred on the last day of the task force meeting. Three individual options were presented. It was immediately evident, that at a minimum, a combination of all options would be an excellent starting point. That suggestion was met with decisive opposition from Governor Burgum.

7) My Option: Following up on the presentation by Charlie Anderson, a rough draft of an alignment was put together prior the last task force meeting. That draft/map was distributed towards the end of the Task Force meeting. At one-point Governor Dayton inquired as to what my alternative would be. My initial response was reciting floodplain policy, indicating that preserving the floodplain was the top priority. Governor Dayton than discovered the draft map that was handed out. Keeping in mind that neither I, Richland/Wilkin JPA or the Upstream Coalition have engineering firms at our "beck and call" there were joint discussions on obtaining an independent engineering analysis. As a follow up to the comments of Governor Dayton, Charlie Anderson has been retained to provide a more detailed analysis of a design the would preserve floodplain while providing flood protection to Fargo.

Steve Jacobson- Norman County Commissioner

It is generally accepted that Fargo-Moorhead needs flood protection. What level of protection and at what cost is the issue of debate. Minimizing the cost, both in dollars, and adverse impacts, is of most importance in developing flood protection for FM.

All should be done to minimize upstream and downstream impacts of the project that will give adequate flood protection to developed areas of the Fargo-Moorhead community.

I came into this task force thinking that, there is no way on earth that the DNR will permit a control structure in the channel of the Red River. I'm not so sure of that anymore. The diversion plan will not work without the control structure. Federal funding will not be available without it.

So something is going to have to give on this. If the DNR does not issue a permit for a southern embankment control structure, Fargo-Moorhead flood protection is going to have to take a different approach.

Curt Johannsen- Mayor, Hendrum

There is no doubt that the people of the Fargo-Moorhead area need and deserve flood protection, just like anyone else in the Red River Valley; however, the debate occurs on what is the proper and best way to achieve it. I believe flood protection is obtainable if people listen to one another and collaborate on a solution as much as they do when they are helping to protect their neighbors from a flood. Unfortunately, this spirit of collaboration has been missing from the discussion for quite some time. However, Governor Mark Dayton and Governor Doug Burgum were able to create a cooperative dialogue through the establishment of the Fargo-Moorhead Area Flood Diversion Task Force which was able to offer some recommendations to the Diversion Authority. The following is my comments on the task force's recommendations.

As much as I support basin wide retention efforts, I believe that distributed storage alone cannot achieve the certifiable level of protection that is necessary to protect Fargo-Moorhead; however, retention efforts should be pursued simultaneously in order to increase the Fargo-Moorhead area's level of protection as well as assist in providing basin wide protection. I also do not believe that a levee only alternative is an acceptable solution since the cost would be comparable to that of a diversion and provide less protection with considerable impacts. Therefore, I support the diversion concept as long as impacts both upstream and downstream are minimized and mitigated to the best of the ability.

I strongly support the task force's consensus of using the full period of record hydrology to determine that the one percent annual chance (100 year) flood level would be at 33,000 cubic feet per second. Furthermore, I agree with the Technical Advisory Group's recommendation for the Western Tie-back Levee as well as the modifications to the Eastern Tie-back Levee in order to reduce upstream impacts, increase floodplain in North Dakota and reduce newly inundated floodplain in Minnesota. In addition, I am in favor of pursuing a design that would allow up to 37 feet passing through town on the Red River during a one percent chance event.

I do not support the Northern Storage Option and adjusted diversion alignment resulting from it. Even though this option preserves more of the natural floodplain, it results in minimal staging area reduction therefore doing very little to reduce upstream impacts. The outcome is less area being

protected with a diversion channel that will have sharp bends resulting in an increase in maintenance costs due to erosion in the channel.

Probably the most significant change to the diversion design would be the Southern embankment alignment. Unfortunately, the Task Force could not come to an agreement on where the alignment should be. Even though each option (7A, B, and C) had their own pros and cons, I strongly believe that a combination of these three alignments could offer the most benefits in reducing upstream impacts. I don't think it is worthwhile to further investigate option 7A since the Minnesota Department of Natural Resources will likely not permit it, and 7B since the Army Corps of Engineers had concerns with it maintaining authorization. Instead, I believe that a combination of both options 7A and 7C warrants further investigation. Whatever the result is, shifting the Southern embankment alignment further North is necessary in order to utilize more of the natural flood plain which will considerably reduce negative impacts.

Despite the fact that allowing more water downstream would result in a modification to the operation plan rather than a change in the diversion design, it still warrants discussion here. The reason that the original design of the diversion had upstream storage built into it was to mitigate downstream impacts. Although the staging area influences the upstream, those effects are considerably less then what the negative impacts would be to the downstream without it. Not only would more structures be affected downstream, which would require costly mitigation, but the potential exists to also cause an increase in water levels at the United States/Canadian border which would require approval from International Joint Commission under the Boundary Waters Treaty. The six inches of additional water that the Technical Advisory Group evaluated sending downstream would cause an impact at the International Border thus violating the treaty unless approval was obtained. Even if approval could be obtained, the process would definitely add several years to the diversion timeline. Not to mention, is it worth upsetting our great neighbors to the North for something that may not even be possible? Furthermore, any additional water sent downstream has the potential to negatively impact existing community flood protection measures and their ability to maintain certification which would require costly mitigation. Any additional water sent downstream that has the potential to negatively affect the agricultural industry must also be taken into consideration.

In closing, I would like to express my gratitude to Governor Dayton and Governor Burgum for the great leadership they showed by establishing the Fargo-Moorhead Area Flood Diversion Task Force. Furthermore, I would like to show my appreciation to the task force members for their valuable, professional input and their collaborative effort to help the Fargo-Moorhead area achieve certifiable flood protection with minimal impacts to their neighbors. I would also like to thank the Technical Advisory Group for all their hard work and expertise. I hope the Diversion Authority continues with this spirit of cooperation by allowing all affected parties, including those both upstream and downstream, to have a voting seat on the Diversion Authority as well as on a future operation plan committee. I wish the Diversion Authority the best of luck in their endeavor of achieving flood protection for the Fargo-Moorhead area.

Jenny Mongeau- Clay County Commissioner

The commitment by Governor Dayton and Governor Burgum to help us work collectively to achieve flood protection is significant. The task force had good dialog and is recommending a solid set of parameters.

The first consensus item that task force agreed to recommend was the full period of record, 33,000 cfs 100 year. We also agreed to recommend allowing additional flows through town of 37-foot. I believe this level is appropriate, having the ability to allow an increased flow through town of up to one foot during extreme flood events should be an option outlined in an operational plan.

Given the previous facts of findings from the Minnesota DNR, I still have significant concerns over the ability for DNR to permit a dam on the Red River. During task force discussion we did not discuss modifying the proposed size of a dam, this is something that may need to be looked at to make it more permittable. Location was discussed and the current alignment incorporates some natural drainage into the river. An issue that I have struggled with is how the percentage of physical impacts and benefits will be divided among the two states. Land that has historically seen flooding during flood events are better suited areas to stage water in comparison to areas that are out of the floodplain. Any plan should focus on allowing water to naturally reside in lower areas.

In terms of how the southern embankment could be aligned in North Dakota we discussed options 7A, 7B, and 7C. My recommendation is to implement a combination of options 7A and 7C. Designing an embankment with limited 90-degree turns will increase structural resilience and decrease overall cost. Surrounding land is within existing floodplain and keeping it as such would offer reduced new impacts. The inclusion of a Western tieback was also an addition that was proposed and the majority of the task force felt it would beneficial to add to the project to keep water within the natural floodplain.

With the designed tieback levy in Minnesota a large amount of staged water will be shifted onto higher ground. I have considerable concern with the amount of newly impacted properties with the project. Doing so would conflict with local water ordinances in Holy Cross township and

Wilkin County. Those issues would need to be addressed to follow Minnesota law. An Eastern tieback levy in Minnesota would run north and south. This would dissect Clay County Ditch #59 and JD #1 running east and west. Significant engineering and reroute would need to be done to those systems to ensure drainage is not hindered.

Within the Minnesota staging area there are approximately 15 sections of land that would be placed into the flood plain. There are concerns in regards to the city of Comstock's infrastructure and access during flood events. I question if ring dike protection will be certifiable because of railroad access points. US Highway 75 and the BNSF railroad, both run north and south and are heavily used corridors. Each system would experience deep inundation of floodwater with a proposed project and a significant road and rail raise must take place. My proposal is to engineer US Highway 75 to the standards of what the Eastern tieback would be, make it the tieback levy. The Army Corps had stated that levies could be used in this capacity. By doing this the land between the road and the Red River could be used as staging, the vast majority of that land is currently susceptible to flooding due to its proximity to the river. Doing this would preserve valuable farmland, eliminate the need to ring dike the city, prevent disruption to Hoff and Comstock cemeteries, and offer huge cost savings by eliminating the need for a rail raise.

In looking at other possible changes The Northern Storage-Channel Alignment did not prove to offer any change to impacts, I'm not sure a change is necessary, but if keeping existing floodplain is important to getting a permit it may be an option.

Keeping impacts at the Canadian border neutral is an important factor. A small threshold exists to allow for minor downstream impacts that could help ease the burden upstream. By allowing up to 4 or 5 inches downstream impact we could see a measurable decrease in the staging area.

Ultimately reducing flow into the mainstem of the Red River south of the metro will continue to serve as an integral part of reducing flood levels. Managing flow of the Wild Rice specifically has been identified as something that could drastically decrease mainstem levels.

A comment has been made in reference to the amount of money the task force recommended alternatives add to the final product. While there is truth in the statement, the reality is that these are proposed elements that could potentially allow a project to be permitted. Without

altering the previously denied project we are stifling our ability to achieve flood protection for the region.

One crucial element of this project is what a final operational plan will look like. We are dealing with an unpredictable mother nature and without having an operational structure in place there is an enormous level of unpredictability that exists. Key questions need to be answered and without knowing how these issues will be addressed, it makes it hard to endorse components of a project. Knowing with certainty how the project will be run will allow for better development of mitigation and evolution of proper easement plans.

The opportunity to have region wide dialog on the components of the Diversion has been important. We've had inclusive, intense conversations to find the best possible alternative. I continue to believe that any project moving forward will be stronger if we continue to include perspectives from all involved. I appreciate the opportunity to have had a seat at this table and I look forward to having further dialog and collaboration.

Joel Paulsen- City Council Member, Moorhead

"Information is the resolution of uncertainty"

-Claude Shannon, American Mathematician

1916-2001

The preceding quote by Mr. Shannon clarifies the mission of the Fargo-Moorhead Area Flood Diversion Task Force. Flood events and the natural weather conditions that create them are by nature uncertain events. At best, our scientific advancements and knowledge have allowed us to somewhat accurately predict the weather only a few days in advance. The purpose of the Task Force was to develop design principles and concept-level engineering solutions to achieve balanced flood risk management for the Fargo-Moorhead region, including up and downstream communities and properties. These concept level engineering solutions were based on an intensive review of information that has been compiled about flooding and flood control in the Red River Valley, with the intent of defining our risk and determining the proper project to deal with that uncertainty.

Governor Dayton and Governor Burgum appointed a group of diverse members with an intent to explore all perspectives related to finding a project that will provide the greatest protection, minimize negative impacts, and is economically feasible. This summary contains a list of Task Force Findings that I believe, when implemented, will meet the objectives of the Task Force, meet the

legal requirements of the States of Minnesota and North Dakota, and fulfill the federal legal requirements as defined in Executive Order 11988 – Floodplain Management. I am encouraged by the work that was done by the Task Force and I look forward to implementing the findings and recommendations of the Task Force and the continued work of the Technical Advisory Group in my role as one of the City of Moorhead's representatives on the Flood Diversion Board of Authority. This is a defining moment for the Metro Area, one that will minimize our flood risk significantly and ensure our metro community remains vibrant, safe, and secure. Nevertheless, I remain concerned about the individuals impacted by the construction and operation of a proposed flood control project. Every effort needs to be done to mitigate potential negative consequences of the project and treat affected citizens fairly throughout project development and implementation.

The Task Force process allowed the discussion of major policy decisions with input from all points of view. It allowed a robust discussion on the science and engineering behind the implementation of physical elements of the project. Finally, it allowed a deep and straightforward conversation with Federal and State regulators. Only when science, engineering, policy, and regulations align will a feasible project present itself.

In closing, we will never be able to fully know what Mother Nature has in store for us, however, we can make prudent decisions to manage the uncertainty and risk through sound engineering judgement and scientific analysis while recognizing and minimizing the sacrifices people have to make to implement a sound, just, and reasonable flood risk management plan.

Del Rae Williams- Mayor, Moorhead

Need for Flood Protection

The City of Moorhead needs additional flood protection and has been a local sponsor of the FM Metro Flood Diversion Project since its inception in 2008. Even with the work that has been done in Moorhead, including the construction of over 12 miles of levees and floodwalls and almost 250 acquisitions, our work is not done. We came to realize that we can no longer complete the work alone as a city, nor should we. The problem of flooding in the Red River Valley is bigger than Moorhead and we need to work together with surrounding communities, in Minnesota and North Dakota, to provide the level of protection we need in a way that makes sense.

Working with Fargo and other members of the Diversion Authority, we developed a good project which was able to get federal authorization and federal appropriations. This was not an easy task. The Diversion Project is big, complex, and comes with a hefty price, both financially and due to impacts. Unfortunately, the project was unable to obtain a permit from the DNR in the form it was in. This left Moorhead without a path to provide the level of flood protection it needs, and it left over 1,000 homes in the city with the risk of being placed in the FEMA 100-year floodplain, therefore stuck with expensive mandatory flood insurance policies.

The people of Moorhead are grateful to Governor Mark Dayton for stepping in and helping usher a solution and a way forward. It was clear that his strong leadership and considerable empathy was needed to bring all parties to the table, resolve what could be resolved, and to help everyone better understand the needs and challenges associated with keeping the public safe from flooding. Together, the Governors were able to do

what we have not been able to locally. They created a forum for healthy dialogue and a renewed sense of commitment amongst the region that we have not had in many years. It is my sincerest hope that these talks will continue and lead to not just flood protection for Moorhead, but additional joint efforts that can have a lasting positive impact on our region of the country.

Task Force Efforts

I am so proud of the work we have been able to accomplish in Moorhead. With the support from those in St. Paul, we have made real strides and our citizens know it. The downside of doing such great work is that people have assumed we are done. This was apparent at the start of the Task Force meeting when much of the discussion was dedicated to what level of protection we are at, and a number of false assumptions were expressed. I want this report to make that issue clear. Not only did the Task Force identify and agree with the significant work that needs to be done to make sure the entire city is safe, the Task Force actually made recommendations that will require an additional $50 million worth of work that should be done within city limits.

I think it is important to address the financial implications to Moorhead and Minnesota. The DNR previously identified a figure of 2 percent as the benefit to Minnesota. The 2 percent benefit figure has been used to calculate the anticipate funding level from the state, which amounts to approximately $43 million. With the changes from the Task Force, this $43 million is likely to go up using the same math. In addition, the $50 million of additional work in town will also have to be funding through the State.

What this tells me is that the project previously developed was a good deal for Minnesota. With the changes from the Task Force to allow for a permittable project, I think the project is still a good deal, but it means our local legislators will have to do a lot of work to obtain that additional funding and continued support from those working in St. Paul is needed.

I also wonder if we would be better off taking this opportunity to truly gain environmental benefits, rather than so narrowly focus on temporary impacts to farmland that will remain farmland. Rather than having the state spend $50 million to buyout more homes and displace families, we could create real environmental benefits such as retention for flood control and water quality improvements, buffer strips, wildlife habitat, etc. Instead, there remains an intense focused on preserving floodplain that is in the flood fringe and could be developed anyway over time.

DNR Dam Safety Permit

The Task Force brought more voices to the table. It was a good venue to discuss a project with a regional level of protection. It was also important for the discussion on where the impacts should be. It's a strange concept that isn't totally unique to water projects, but is certainly more prevalent. In order to protect the urban areas from being under water during a flood, you need to find a more appropriate place to store it. In essence, you have the unfortunate task of deciding where that water goes, and who ends up impacted. The changes suggested impact more people, more homes, and more farmsteads. This is unfortunate, but it also allows us to create less new floodplain land, which is important to obtaining a Minnesota permit.

It is now up to regulators at the DNR to be fair and give direction to our technical team as it submits a new permit. I urge them to work quickly so permitting can be completed early this year to allow the use of the construction season before we lose out to another long winter. Governor Dayton laid out a path forward for us so that failure is not an option, and I expect all parties to move along that same path to obtain a permit, end litigation, and protect Minnesotans.

North Dakota Representatives:

Jason Benson- Cass County Engineer

The Governors' Diversion Task Force was a much needed process to bring all parties to the table. While there are many challenges ahead, I am in concurrence on the following items: 33,000 cfs for the 100-year flood, changes to the eastern and western tieback levee, 37-feet of flow through town, no change to the channel alignment from the inlet north to the outlet, and moving forward with option 7c for the southern embankment. While I concur with the items above, I feel the Task Force process never fully addressed the requirements of the Dam Safety Permit. In the end, the recommendations brought forward increase the cost of the project while decreasing the "dam safety" by making the project less robust, less resilient, and less reliable.

The Task Force was an excellent opportunity to learn about the current project. Over eight years we have studied, analyzed, and developed plans in order to reduce impacts and ensure a robust project was developed to protect the Fargo-Moorhead area both now and into the future. I think the Task Force meetings showed the current project design is the most cost-effective design for providing 100-year FEMA certifiable flood protection with the ability to fight up to a 500-year flood event. The Task Force meetings also made it clear that changes to the current design would need to be made for the MDNR to permit the project.

The changes brought forward were viable, but many of these options fell short when looking at the other criteria.

- **Costs:** Prior to meeting, there were several media interviews given by members of the Task Force in which the public was told there was a cheaper, better option available. It is clear now that every option evaluated increased the cost of the project by hundreds of millions of dollars. Adding substantial cost increases are not viable without a significant influx of new money from Minnesota and North Dakota. Citizens in Fargo and Cass County have already voted to tax themselves until 2084. Our local residents have shouldered their share of the financial burden. I ask both Governors to provide additional state funding to address these new costs.
- **Reduce Environmental Impacts:** The suggested changes reduce the newly impacted acres in Minnesota and better balance the impacts between the states.
- **Minimize Residual Risk:** The suggested changes increased residual risk to the project.
- **Limit Impacts to Structures:** Every significant option presented impacted a significantly higher number of rural farmsteads and residences. In addition, the 37-feet of flow dramatically impacts city and rural properties and cuts off a number of additional access roads.

- **Resilience and Robustness of Design:** Increasing to 37-feet of flow, along with changes to the southern embankment only add to the length and complexity of the embankment and reduce the project's resiliency and robustness.

Several Task Force principles were not resolved.

1. I encourage future operational plan discussions to include both upstream and downstream involvement once a final alignment is known.
2. Compensation program for the inundated lands should remain a top priority to be finalized in the near future.

A reoccurring challenge was the moving target in what the MDNR deemed would be a permitable project. Given the goal was to obtain a Dam Safety Permit, it is frustrating that every option considered increased the cost while decreasing the safety of the dam. No alternative was presented that actually made the dam safer. I was also frustrated in the downplaying of the permanent impacts due to construction. Over 7,900 acres of permanent impacts under the diversion channel and embankment are in ND and 433 acres in MN. These permanent impacts should be treated with a greater weight than a temporary impact. For comparison, there are 6,900 acres of newly impacted acres in MN, but these temporary impacts were a primary point of discussion. Also, these temporary impacts would have only occurred less than 30 days over the last 115 years and allowing the land to be farmed every year. However, the 7,900 acres in ND will never be farmed again and forever changed. These permanent impacts are likely the reason Gov. Dayton declared the Minnesota alignment was not possible and so they should be thoroughly addressed by the MDNR in its analysis.

It is critical the permitting requirements are clear. The discussion of a conditional permitting process is encouraging. In hopes of continuing the successful communications of the Task Force, I want to request that the DNR attend our Diversion Authority meetings and provide routine updates.

In the end, our efforts all serve the same taxpayers. With this in mind, it is essential that we move quickly to address the soon to expire contract between the Corps and Ames Construction for the completion of the inlet control structure. A March 2018 deadline is approaching and failure to address this issue would result in costing tax payers millions of dollars.

As Gov. Dayton expressed at the Task Force Meeting, acquiring the lands necessary needs to be a top priority and should start up again as soon as possible. Given past communications which led to halting these activities, the MDNR needs to expressly respond to, and support this position.

Fargo and Moorhead, along with Cass and Clay Counties formed the Diversion Authority to work jointly across two great states to provide permanent flood protection. With the additional leadership displayed by the leaders of Minnesota and North Dakota, I believe we reviewed the more than one hundred alternatives previously studied and identified the substantial changes needed to obtain a Minnesota permit. These changes will result in hundreds of millions of dollars of additional taxpayer dollars, including nearly $100 million from Minnesota alone. These changes will not be easy to implement, or easy to explain to the owners of the additional homes and farmsteads impacted. It

is my hope that the state of Minnesota will act swiftly on conditional permitting and then help us as we communicate the changes to the public.

Ron Bergan- Fargo Business Leader and Entrepreneur

I appreciated being part of the Task Force and all the work the MN DNR put forth working with the Task Force. Also, thanks to Governor Dayton for attending every meeting. We learned a lot about floods and flood protection for the F/M area. The 100 year protection consensus of the Task Force is low compared to the 250, 500, 700, 1,000 and even larger floods that could occur. It was reported that the Minot flood was about 10 times the 100 year protection they had in place. It was reported that the storage dams also in place were full at the start of this flood. They probably caused the flood to be much larger with the entire flood flow going over the dam. At some point concerns of dam failure cause you to open the control gates and the flood becomes larger than without the dam. See attached report showing the effect of dams on flooding. The 'mean annual flood' is reduced by ½ while the size of the flood likely to recur every 50 years barely changed. The risk of dam failure in 100 year and larger floods makes dams "dangerously deceptive". Grand Fork, Minot and Bismarck all have had floods greater than the 100 year level in recent years.

The Diversion will allow us to have a chance to win a 500 year flood fight. Looking at the 500 year flood map, the flood extends west of Mapleton and looks more like a large lake.

The Diversion is designed to give us protection for 100's of years. I am concerned that changes we are considering will cause the risk of failure to increase significantly especially in the very long term. Failures was one of the concerns of the DNR. We need to consider the Red River Basin Commission recommendation that the population should grow in cities protected from flooding, therefore we need adequate area for expansion in F/M.

The Task Force found that all reasonable alternatives were or had been studied and a Diversion is the only alternative to give us the desired protection. I believe the Corps and the local engineers did a very good job also of selecting the route for the diversion balancing the environmental concerns, costs, etc. The western and eastern tie-back levies and allowing 37' through town are acceptable compromises to the Minnesota DNR. It should be noted that the 37' flow affects 82 additional homes in Fargo and adds significant costs.

The northern storage area is not acceptable to me.

The alternatives for additional storage – 7A, 7B and 7C were presented to the Task Force at the last meeting but we were not given adequate time to study the data. After looking at the data I feel the impacts on additional homes and structures that would need to be removed is very significant. There is only a small change in looking at the upstream impacted acres or the protected floodplain acres. These alternatives greatly impact many people for the sake of a few acres of land. The upstream floodplain acres are only affected 38 days in the full period of record. The approximately 8,000 acres permanently removed from production for the Diversion Channel in ND are not shown in the spreadsheet. The cost estimate for 7C alone is $180M (26 more homes in Cass County and about seven more miles of the Dam).

The operating plans for the Diversion should be modified to consider reducing the peak flow at downstream cities for their floods which may not be the same as the peak at the Diversion outlet. More flow may be ok earlier versus later when considering the effects of the other rivers downstream.

Excerpted from *Silenced Rivers*: **The Ecology and Politics of Large Dams**

Patrick McCully. October 10, 2007

Even if flood control is not an intended consequence of a project, a storage dam will almost always delay floods downstream and reduce the size of average flood peaks, commonly by more than a quarter (even a flood control dam, however, may have little effect upon extremely large and infrequent floods — making the 'flood control' offered by dams often dangerously deceptive for people who move onto the downstream floodplain). The Warragamba Dam in Australia, for example, reduced the 'mean annual flood' (a flood likely to recur on average every 2.3 years) by more than half, while the size of the flood likely to recur every 50 years barely changed.

Nathan Berseth- Richland County Commissioner

1. **Apply Least Impact Principles:** The Minnesota Environmental Policy Act prohibits DNR from permitting a project when there are feasible alternatives which significantly reduce the environmental impacts. The least impact principle permeates all of the regulations governing dam permitting and public waters permitting.

2. **Address Permit Conditions:** During the task force deliberations, very little effort was made expressly to apply the permit requirement. The focus of the deliberations was to find a project that reduced impacts and which Diversion Authority could accept. On occasion, a Minnesota official would point out that the configuration being discussed was likely not permittable. That should have led to a discussion of what, then, must be done in order to meet permit conditions. We cannot arrive at an acceptable project unless the Commissioner's permit conditions are itemized and the parties then work through each condition and find ways to meet those

conditions.

3. **Minnesota Project Sets Ceiling on Permissible Impacts.** The North Dakota alignment has significantly greater downstream Impacts than Minnesota alignment of the same capacity and results in nearly twice the stage increase. This doubling of impact results because the LPP eliminates floodplain storage south and northwest of Fargo. Engineer Anderson put it this way:

> *"The North Dakota diversion flows through a low floodplain area thus draining floodplain and also isolating existing floodplain areas, by levees along its alignment, resulting in excessive loss of floodplain storage. The MN Diversion flows through higher ground generally not within the floodplain thereby having minimal effect on floodplain storage along the alignment."*

To avoid these impacts, the project must abandon its attempt to flood protect the undeveloped floodplain, whether the diversion flows through Minnesota or North Dakota.

4. **Minnesota Alternative Meets National Objectives.** The USACE selected the Minnesota diversion as the least impact project which best meets national objectives. The LPP costs $1 billion more than the least impact project, eliminates 50 square miles of floodplain storage more than the Minnesota diversion, and consequently develops more downstream impacts. The billion dollars saved could then be used for distributed storage or other needed improvements.

5. **Change the operative underlying principles—maximize floodplain retention.** If a North Dakota alternative is deemed desirable, the Technical Panel should have been asked-- to design a North Dakota project that maximizes floodplain retention. None of the options studied by the Technical panels were based on that concept. Rather, the task force was continually pressured to foster as much flood plain development as possible. As a result, the task force never considered, options that fully minimize floodplain loss. The Technical Panel inappropriately eliminated options which preserved the floodplain northwest of Fargo. Developing that floodplain is bad for Fargo's sound development: In separate articles, Governor Burgum is quoted in the Fargo Forum as follows: "

> *The reverse of smart growth, in Burgum's view, is sparse development on the city's edge, where it costs the city more to deliver services than developed property contributes in property tax revenues….*
>
> *Our city has an ability to grow and grow smarter than other cities by growing more densely as opposed to growing horizontally," he told the Planning Commission. "The 52 square miles is enough to hold us for a long time."*

Over half of the flood storage eliminated in the LPP is found on the Northwest floodplain. Instead of eliminating that storage, it should be enhanced.

6. **Federal and State Law Prohibits Avoidable Floodplain Development. T**he current project

violates section 1962-3. Under that law, the projectmust avoid the unwise use of floodplains and flood-prone areas and minimize adverse impacts and vulnerabilities.

7. **Apply Sound Engineering Concepts Designed to Minimize Impacts.** DNR should be applying the concepts described by engineer Anderson:

    a. Implement a major system of coordinated distributed storage throughout the basin. (achieves approximately 2 feet reduction in peak flow)

    b. Move the North Dakota Alignment East

    c. Reduce tributary crossings

    d. Redesign the dikework and structures along the channel to restrict inflows from the tributaries and allow water to enter the floodplain area on the west side

    e. Alter the configuration so flood protection follows the edge of the developed area as close as practical.

    f. Provide an understandable operating plan that can be modelled.

8. **Use Distributed Storage:** During deliberations, some have advocated that distributed storage should exclusively be used to mitigate floodwaters not caused by the project instead of mitigating excess flood water from the Fargo area. This is a false dichotomy. Distributed storage properly placed in watersheds tributary to the Red River will accomplish both objectives and reduce peak flows by two feet. Given any project design, the peak flows on the Red below Fargo will be two feet lower with distributed storage than without.

9. **Use Federal Funding Available under WRRDA to leverage state funding for distributed storage.** The reluctance to consider distributed storage stems from the misperception by Diversion Authority that project opponents have advanced distributed storage as a standalone solution. JPA sees distributed storage as a project enhancer that will significantly reduce project impacts and benefit the entire basin in Minnesota. If distributed storage accompanies this project, it becomes eligible for WRRDA funding that will benefit the entire basin and could trigger a major commitment of state bonding dollars to support the basin wide improvements that would then flow from the project. As modified, the project could offer significant benefits to Minnesota.

10. **Involve all parties in Examination of the Operating Plan.** The operating plan is a critical component of any flood control project. Stakeholders cannot understand the impact of the project without understanding the operating plan.

11. **Develop Dialog on the Takings and Compensation Implications of the Project.** A major flaw in the project as submitted to the DNR is that it failed to provide a defensible realistic approach to takings.

Bernie Dardis- Board Chair, Greater North Dakota Chamber of Commerce

Being chosen as one of the members of the Governors' Task Force was a true honor. After seeing the toil flooding has taken on the region, being a part of providing a permanent solution is something I hope I will always be able to look proudly back on. I say I hope, because the work is not done. Several large changes to the project were recommended, but we left unknowing how the DNR would consider these through the permitting process or how we would pay the additional costs, which are considerable.

When Governor Burgum asked me to serve, it gave me pause because I wasn't sure what I had to offer. I have paid attention to the Diversion Project closely, but I was not familiar with all the details. The more I thought about it, the more I realized I might be in a unique situation to provide perspective. I was identified as Chairman of the Greater North Dakota Chamber, but I didn't feel that meant I was looking out for only North Dakota. As CEO of Indigo Signs, we had significant business interests across North Dakota and Minnesota. I often thought about the economic prosperity of both states as I made my way between locations on trips back and forth on I-94. It is with this mindset that I set out to do my job as a member of the Task Force.

Flood Insurance

When discussing flood protection with those more technically inclined than myself, the conversation usually turns to river stages, flows per second, and other hydraulic factors. While these are important when designing a project, they are not the first things on the minds of the public. When I'm at meetings around town or talking to neighbors, the topic that comes up most frequently is something much closer to the pocket book, flood insurance.

The technical presentations from city engineers in Fargo and Moorhead showed that more than 1,000 homes in Moorhead and more than 11,000 in Fargo are at risk of being mandated to carry federal flood insurance. Too often, this topic is ignored when we talk about the need for flood protection and the speed at which we need to accomplish it. We know that the flood risk is the highest in early spring, the risk of flood insurance is something that impacts people every day.

According to the information at the Task Force from the DNR's website, a primary $200,000 residential property can expect to pay in excess of $4,000 a year in flood insurance. The kicker here is that this rate is actually subsidized by the federal government. Over the last several years, we have seen Congress slowly chisel away at this subsidy to work towards a more actuarial rate. The DNR's document estimates that a non-subsidized rate for a similar house that sits at an elevation similar to the 2009 flood would face almost double the rate at $8,000 a year. This is 4% of the price of the house every year! I have seen estimates that across Fargo-Moorhead this could mean $30-50 million in annual premiums. This would be money leaving our economy, rather than being reinvested here locally. This is an economic catastrophe that worries me as much or more than the risk of actual flooding.

The long-term results of these flood insurance requirements will mean the detriment of our existing housing stock, the tumbling of property values, the loss of family's retirement nest eggs, and the loss

of considerable tax revenue for government entities in North Dakota and Minnesota. It was clear from FEMA's testimony, the longer we wait, the more we are putting our economies at risk. These requirements aren't going away, they are only getting more fiscally stringent. The time to act is now.

More than Fargo and Moorhead

As a proud resident of West Fargo, I fully understand the frustrations, challenges, and the benefits of living outside of Fargo or Moorhead city limits. The FM Diversion provides protection to much more than just those Fargo and Moorhead. Fargo-Moorhead is a regional center for employment, entertainment, healthcare, and more. Like we've seen during past floods, when it floods in Fargo-Moorhead, every community within 100 miles feels it and pitches in to help solve it. This is how it is, but what was concerning to me was during the Task Force when the focus seemed to only be on the area within city limits. Fargo's and Moorhead's flood problems have never been dealt with solely by city residents, why start now? The changes being recommended mostly come at the expense of protection to the areas around Horace, West Fargo, Harwood and other rural areas that have always headed the call to sandbag when needed. I urge the Minnesota DNR to place a value on those homes in rural areas as those families are just as tough to displace as those in town.

Next Steps

I think it was Governor Dayton at the Task Force who said something like, don't let the perfect get in the way of good. I worry about where we left the implementation of the project. We made a lot of progress on a number of items and it seemed there was a majority consensus around modifying the location of the dam to option C. The DNR said option A would not be permittable and the Corps said option B would lose authorization. Engineers are a godsend, but if left to deliberate, study, and model scenarios, the strive towards perfect could be longer than we can afford. I urge Governor Dayton and Commissioner Landwehr, who I sincerely enjoyed getting to know over the last few months, to stay the course and help drive for a solution. While we have spent months meeting, the public has waited far longer for leaders to decide their fate. We owe to the citizens of Fargo and Moorhead, and to those in surrounding communities of West Fargo, Dilworth, Harwood and across Cass and Clay Counties, a project that protects them.

Craig Hertsgaard- Farmer, Richland County

The Task Force was charged with finding flood control solutions for Fargo-Moorhead that met two Key Parameters. The first was that solutions providing FEMA accredited 100 year flood protection must meet Minnesota and North Dakota statutes, and the second that federal authorization and associated funding tied to the Diversion Authority's project be maintained unless a lower cost method of flood control could be developed. Maintaining federal authorization, if needed, doesn't appear to be a problem. Army Corps representatives stated that the Undersecretary for Civil Works has broad powers to interpret Congressional directives, and communications with unified elected officials from both states would be influential in making their decision. It was also pointed out that

there are fast track remedies to alter previous authorizations that would not significantly delay the project. There was little discussion of the likelihood of full funding for the current or alternate projects.

The Task Force never arrived at a flood solution that met the stated goals and could be permitted by both states. The North Dakota State Engineer appears willing to permit any project the Diversion Authority has proposed. The Task Force would not have been assembled if the same were true of the DNR. The focus of the Task Force then becomes finding a project that meets the requirements of Minnesota law.

DNR Commissioner Tom Landwehr and Administrator Kent Lokkesmoe on several occasions defined Minnesota statutes as requiring the project conform to federal and state floodplain policies and have as little adverse impacts on population and the socioeconomic base as possible. Federal directives say projects should not encourage flood plain development, and Minnesota rules require governmental units to prohibit floodplain development. The task must be to find a flood control project that removes as little of the natural flood plain as possible, and has the least amount of negative impact on the surrounding region.

Identifying area to be protected.

The Task Force identified the area needed to be protected. Presentations from city engineers of Fargo and Moorhead delineated areas that needed flood protection. That area was similarly identified in technical committee modeling labeled Levee Only.

Level of Protection

The Task Force agreed on a level of protection of 33,000 cfs, or approximately 41.3 feet. City engineers described current dikes and levees as being constructed to levels between 42.5 and 44.5 feet. The State of North Dakota appropriated funds for Fargo to complete levees that would provide certifiable flood protection of 39.4 feet.

Protection above a 100 year flood

It was generally agreed that a diversion structure could provide additional protection needed to the 100 year flood level of 33,000 cfs. Representatives of the DNR as well as many Task Force members recommended Distributed Storage be constructed to provide protection beyond the 100 year level.

Diversion Channel Alignment

The Task Force never developed a process for determining diversion channel alignment, and as a result, did not make any recommendations. Several alignment options were reviewed at the Task Force's final meeting, with little time for critical evaluation or tracing the source of the proposals. None of the proposals presented seemed likely to be permitted by the DNR.

Moving Forward

It is clear that a different approach must be taken to meet the original goals of the Task Force. The group was restricted in their deliberations by adhering to features of a project proposal that is in violation of federal and state laws. If federal floodplain guidelines, and Minnesota statues are to be enforced, a successful design must be made on the following basis:

1. **Only the most reasonable contiguous developed area must be protected.** Fargo, and to some extent, Moorhead, are built in a flood plain. While there was good reason for their location 150 years ago, those reasons do not apply to future growth. Moorhead has virtually unlimited area to grow outside the 100, and 500 hundred year flood plains. Transportation arteries and existing infrastructure and development can be protected within state and federal floodplain laws. The natural floodplain and river channels weren't determined by state or federal law. It is a waste of the region's economic resources to design a project with provincial protection instead of regional flood protection.
2. **A diversion alignment must remove as little natural floodplain as possible.** The identified alignment that has the least floodplain impact is the original plan proposed by the Army Corps on the Minnesota side of the river. If that is not adopted, then any North Dakota route must follow the edges of the contiguous developed area as closely possible to avoid draining the natural floodplain. Rural structure counts used to justify large scale destruction of the flood plain are misleading and easily manipulated. Rural flood plain destruction requires a one to one trade with areas upstream and downstream that do not currently flood. The size of the rural 100 year floodplain transfer has huge impacts on communities, school districts, and townships, with no inexpensive compensation plan identified.
3. **Distributed storage should be utilized for protection above the 100 year flood level.** The cost of DSA construction can be shared regionally and nationally. A smaller, and less costly diversion can be constructed if it is sized for a 100 year flood.
4. **State and local officials should consider a plan that is locally sponsored and constructed.** It is clear that the length and complexity of any diversion is going to make the project costly. The Army Corps has constructed two simple diversions of less than five miles in length in the region in the last ten years. Both doubled in cost. Fargo engineers reported to the Task Force that their levee system will double in cost. The Oxbow ring dike and country club enhancement project doubled in cost. There is no reason to expect this project would be any different. The size of the proposed diversion will make an Army Corps directed project financially unsustainable.

Thank you for the opportunity to serve on the Task Force.

Tami Norgard- Managing Partner, Vogel Law Firm'

I appreciate the opportunity to engage in this important and historic process. While another month would bring us closer to a permittable levee alignment, the Task Force succeeded in identifying new key features that significantly reduce impacts of the project for upstream entities and Minnesota while retaining federal authorization.

The MNDNR's involvement provides a permitting advantage moving forward. While the original project was not permitted for a variety of reasons, MNDNR now studied the options and identified features, which should increase its understanding of the social and economic impacts of proposed project modifications that were merely conceptual when suggested as the original permit was denied. MNDNR now has a stronger basis on which to permit a new project, given the lack of or impact of alternatives.

The Technical Team brought forth solutions that optimized numerous important factors; not just minimizing the amount of floodplain removed, but also considering financial and social costs, additional home buyouts and added risk to the communities. MNDNR should find an iteration similar to 7A or 7C to be permittable. The permitability does not rise or fall on whether there is another alternative that removes less floodplain acreage. The entire metro area is within a floodplain, so feature selection is a precarious balancing act, identifying where to draw the lines of protection. The crucial inquiry is how many homes and citizens should be protected, at what cost and at what burden to upstream landowners. Either 7A or 7C represents a significant victory for Richland and Wilkin Counties, and an enormous compromise of the Diversion Authority.

MNDNR should be reasonable in encouraging an affordable embankment alignment. Since 1900, only 5 flood events would have impounded any water upstream with alignment 7C and 37 feet of water through town. Most of that inundation would happen during spring flooding, resulting in little or no impact on planting. This is not constant or regular flooding.

The Tech Team's optimizing of critical factors should be viewed favorably by MNDNR in permitting. Implementing 7C and 37 feet through town, for example, distributes newly impacted upstream acreage more equitably, with the ND/MN impacts split 45/55. In addition, the channel impacts over 8000 acres, 95% of which is in ND. 7C reduces newly impacted acreage in Richland and Wilkin Counties from 1124 and 1391 acres down to 337 and 239, respectively, mostly impacting low areas like creek bottoms. 7C reduces the need to mitigate homes in Richland County from 3 to 2, and in Wilkin County from 5 to 2.

The 7C and 37 feet through town option would be a significant compromise. 8000 less acres will be protected in the metro in order to save 2700 acres upstream from having flood easements. 102 more homes would be removed and metro families displaced in order to save 6 homes in Richland, Wilkin and Clay counties. There will be more risk to thousands of city residents by sending 37' of water through town, causing more pressure on levees and less freeboard in many areas. Further, this is only 100 year protection, which is a huge compromise since the 100 year protection levels have been

surpassed in many communities in recent years all over the country. And importantly for ND entities, this higher risk, less protection project will cost approximately $350-400 million more.

The 7C option example represents a significant compromise by all. If much more is required by MNDNR, it may incentivize the Diversion Authority to spend 18 months continuing litigation rather than spend $500 million or more in additional concessions. While I respect the Court's preliminary injunction and the resulting push to settle this dispute, I believe the chance that a permanent injunction would be issued or be upheld on appeal is uncertain. The Corps of Engineers builds projects across the country using this same arrangement, each of which will be compromised if the Court issues a permanent injunction. When imposing its preliminary injunction, the Court held that the Corps' arrangement was a federal scheme where the sponsor agreed to comply with state permitting, with the Court questioning whether to hold them to it. If upheld, this purported federal scheme provides an inordinate amount of power to local governments since the JPA argued that MNDNR cannot issue a permit if a project violates a city or township's ordinance (i.e., the Holy Cross township ordinance that was passed to stop this project). If taken to its logical extreme, in order for a permanent injunction to be imposed, a Court would have to find that Congress intended that this federal scheme would be vulnerable to wasting millions of dollars of federal investment and time if a local government passed an ordinance during project development that prohibited the project. The very concept of federal sovereign immunity allows the Corps to develop projects without being subjected to a plethora of lawsuits by project opponents or by local governments that deny permits for or spot zone to prohibit an unpopular project. If a permanent injunction were issued, it would mark a significant shift away from federal sovereignty and could compromise thousands of federal projects across the country. My point is not to predict the outcome of the merits of a permanent injunction, but to underscore that there is incentive for the MNDNR to be reasonable, and for the JPA to engage in settlement discussions.

The metro area needs flood protection, like other Red River Valley cities have enjoyed without this level of regulatory intervention or required mitigation. The Diversion Authority suggested numerous concessions in hopes of finding a permittable project. If the Diversion Authority is met with too hard a line, it may understandably continue litigation in order to save $350-400 million, 102 homes and protect 8000 more acres. Continued litigation is expensive and risky for everyone. All parties should instead choose to actively work towards a reasonable solution and find a way to provide this community with affordable, feasible, permittable flood protection.

John Strand- Fargo City Commissioner

Understanding another's perspective is usually the best means to solve a disagreement. I was honored to be asked to serve on the Task Force by Governor Burgum to help bring people with diverse perspectives together to find a common understanding. Together with Governor Dayton, these two great leaders rose to the top -- leading the Task Force with mutual respect and poise. While the Task Force pointed us in the right direction, work remains on a number of topics that will continue to benefit from the leadership and guidance of the Governors and local stakeholders.

Balancing the Costs and Impacts of Providing Public Safety

We already know the costs of comprehensive, adequate flood protection for Fargo-Moorhead will exceed $2 billion. The Task Force discovered there is neither a cheaper nor more affordable alternative. In fact, the Task Force's recommended changes, while balancing the location of impacts along with the impact on the floodplain, have increased the overall cost to the taxpayer an estimated $200 - $400 million. The ability to pay is finite while the need to provide for public protection is not. We must be prudent as we balance funding challenges with public safety needs of our citizens and future generations.

Remember the Land Permanently Sacrificed

Much of the focus of the Task Force was on impacts upstream where water is estimated to be staged once every 21 years, which is a lower frequency as a result of the Task Force recommendation to increase flows through town to 37 feet. Though I support this change, it's not without strong reservations and concerns about increased public safety risks associated with allowing greater water levels pushing against the over 20 miles of levees and floodwalls Fargo has built since 2009.

I felt the Task Force could have been provided a more detailed report during the presentation regarding the goal to balance the impacts between the two states.

In addition to upstream property impacts, we also can't overlook the great sacrifice being asked of many landowners who will permanently lose farmland under the footprint of construction. Over 8,000 acres, almost all tillable, would be lost permanently due to construction and will need to be acquired outright. Over 95% of this land is located within the State of North Dakota. Any further comparison of impacts between the two states must include these impacted acres as well.

Compromise and Continued Communication

The Task Force allowed for an open exchange of ideas that resulted in numerous compromises. Nothing is achieved successfully, for the long-term, unless compromise is sought at the start. These compromises will ensure a viable, responsible and successful project. This communication cannot stop now. I expect that these few meetings, which have already increased dialogue, will lead to further collaboration among the Diversion Authority and the folks upstream and downstream, and of course our neighbors in Minnesota.

An End to Litigation

It is my sincere hope that the effort by so many through this Task Force will result in the end of the litigation that has plagued our communities, counties and states for over four years. Taxing our citizens to pay for our courtroom battles must come to a close. The Governors' report should serve as a beginning to an end and a means to close the door on our legal debate. I urge all parties, who were present at the Task Force, to form a bonding agreement that finds a path forward where compromise and cooperation can be codified and the permanent flood protection we need is realized.

Process Should Drive the Policy of the Southern Embankment

I have heard of no item more contentious than the location of the dam and the southern embankment. The Task Force had a number of positive discussions about this topic, but I accept that it is our failure that we did not provide a clear path forward on this topic.

At the last meeting, three options were presented showing attempts to balance impacts and find compromise among the varied interests. Mr. Lokkesmoe stated clearly that Option A could not be permitted and both his words and the data shown put options B and C as nearly identical toward the goals set forth in the Task Force Charter. After that, Colonel Calkins spoke of the increased public safety risks associated with doubling the length of the embankment so near a dense population that option B would not meet the standards set by federal authorization. While many spoke in support for Option C as the preferred choice, discussion was ended before clear direction was given.

Understanding the need for further study of the exact location, there was only one option that met the goals of the Charter to further balance the impacts between the states, reduce the impacts mostly out of neighboring counties, maintain authorization, and was equal toward getting to a permit. This was Option C, and I urge the technical group to include this option in its final report.

The Task Force was more successful than many could have hoped. The leadership and contributions of the governors was most appreciated. As Governor Dayton stated, "failure is not an option." The legacy we leave future generations is ours to script here and now.

Ken Vein- City Council Member, Grand Forks

Governors and Task Force members agreed to the 'Task Force Charter' which defines **Purpose** and **Key Parameters**. **Purpose** was to develop 'Design Principles' and 'Concept-Level Engineering Solutions' to achieve balanced flood risk management for Fargo-Moorhead region. **Key Parameters** are 'Finding Solutions that 'Meet Applicable Local and State Law' and 'Maintain Federal Authorization and Appropriations' (unless more expedient and low-cost options are presented). I felt it was essential to use this charter as the framework for my recommendations to achieve balanced flood risk management.

The **Key Parameter** of 'finding solutions that meet local and state law' was frustrating as I was never able to understand Minnesota law requirements and why the current project did not receive a permit. On several occasions task force member Tami Norgard asked for clarification of state law, but answers never had clarity I could understand. It appears the intent of MN DNR was to more closely balance new water storage between both states and to send more water downstream.

The second **Key Parameter** of 'maintaining federal authorization and funding' indicated the current project remains the base project, but subject to 'expedient and low-cost options' to meet applicable local and state law.

I commend the Governors for establishing and utilizing the Technical Advisor Group (TAG). TAG was able to quickly analyze Concept Level Engineering Solutions. They, along with their support staff and consultants, should be commended.

Task Force agreed on the 'Design Principles' of setting 100-year flood flow at 33,000 cfs. I felt there was general agreement that Distributed Storage has basin-wide benefits but wouldn't be incorporated into project design.

Task Force assessed six Concept-Level Engineering Solutions studied by TAG. My level of support is as follows:

> I support adding both Western Tie-Back Levee and Eastern Tie-Back Levee. Both solutions were supported by TAG as they reduce upstream impacts and are expedient and low-cost.

I do not support increasing the river stage of water through town to 37 ft. It creates more risk, significantly increases cost to construct and operate, protects fewer properties and negatively impacts life-safety for those within the project limits. This option is neither expedient nor low cost.

I do not support adding Northern Storage. Very minimal benefit (reduction in elevation of up-stream staging area) and TAG was neutral.

I do not support moving the southern embankment further north. Moving a high hazard dam closer to populated areas and adding considerable length to the dam adds risk and cost. It also reduces the geographic area protected and results in impacting more people and structures. This option is neither expedient nor low cost.

At this time, I do not support an increase in downstream water levels because impacts have not been studied and would be felt all the way to the Canadian border. Canada has a history of suing ND on water issues which historically has delayed projects. Mitigation costs in the Grand Forks/East Grand Forks area alone could easily exceed $100 M. This option is neither expedient nor low cost.

The Task Force made progress but did not come to final consensus. A significant benefit to the process was bringing Governor Dayton and Governor Burgum to the table. It was very impressive how both Governors were engaged, dedicating time and effort to the process. With both Governors co-chairing the meetings, they brought a sense of authority and respect that helped the process work. It was very beneficial to have all 16 task force members at the table, allowing us to hear from different perspectives.

Critical Take Away's from Process.

- NED plan is a Minnesota diversion, which Minnesota has refused to allow.
- Minnesota DNR has declined to permit the project, so changes are required for a permit to be issued. We need to understand what changes are required for a permit to be issued.
- Tie-back levees and diversion channel of this magnitude have a significant footprint and forever impact the physical day to day operations of adjacent land owners. The 8,000 acre footprint should be considered in the impact balance between the states.
- Both upstream and downstream impacted property owners are not sure of overall mitigation strategy.

- The Operations plan will have a significant impact on adjacent properties and needs to be developed
- The southern embankment is a high hazard dam that will primarily operate as a dry dam. History has shown there will be a very limited number of days where water will be impounded.
- The primary diversion structure is a mechanical system that will typically operate at sub-freezing temperatures, and will have operational risk.
- Several Concept-Level Engineering solutions had significant cost increases. It was not clear who would pay the increased costs and/or if the funding was available.
- The current project was designed by the Corps of Engineers under a consistent set of national standards with no personal or political bias.
- Credit needs to be given to Diversion Authority for designating funding for future storage projects.

My Recommendations:

1 Leave all major project features intact
2 Add both the Western and Eastern Tie-Back Levee's to the project
3 Continue a strong collaborative process with DNR to achieve permitability
   a. DNR needs to define permit requirements
   b. Keep TAG process engaged
   c. TAG should study additional features such as creating new wetlands, buffer strips, retention sites, etc. that could be incorporated into the project as environmental benefits to the region and to reduce upstream impacts
   d. Corps of Engineers needs to be part of this process as they are essential to maintaining federal authorization and appropriations
   e. Collaborate with downstream entities in a comprehensive study of potential downstream impacts and how to mitigate
4 Diversion Authority consider:
   a. Add up-stream and down-stream representatives to the Authority
   b. Communicate a Comprehensive Mitigation Plan to address mitigation of all negative impacts, upstream and downstream
   c. Create an Operations Committee to establish Operation Plan
5 Governors continue to collaborate with each other, making sure there is a process for all constituencies to be heard
6 Act swiftly as project needs to proceed asap

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V. Technical Advisory Group Appendices

Appendices from the Technical Advisory Group can be downloaded individually on the Minnesota DNR's and Diversion Authority's websites.

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St. Paul District

Appendix D: Hydrology and Hydraulics

Fargo-Moorhead Metropolitan Area
Flood Risk Management Project

2018 Supplemental Environmental Assessment

DRAFT June 4, 2018

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Appendix D: Hydrology and Hydraulics

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Appendix D: Hydrology and Hydraulics

1 OVERVIEW OF CHANGES SINCE 2013 SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

The Fargo-Moorhead Metropolitan Area is a flood prone area located in Cass County, North Dakota and Clay County, Minnesota. The Final Feasibility Report and Environmental Impact Statement (FEIS) for the Fargo-Moorhead Metropolitan Area Flood Risk Management Project (Project) was completed in July 2011 to investigate flood issues, identify flood risk management measures, and recommend implementation of a federal project, if appropriate. After the analysis of alternative designs in the FEIS, the Locally Preferred Plan (LPP) became the Federally Recommended Plan (FRP).

Detailed engineering and design studies conducted after the completion of the FEIS resulted in several modifications to the Project. Modifications included: Diversion Channel modifications, including alignment shifts and channel cross-section modifications; the addition of levees and floodwalls in downtown Fargo; and a ring levee around the towns of Oxbow, Hickson, and Bakke, North Dakota. These modifications resulted in the preparation of the September 2013 Supplemental Environmental Assessment for the Project, which addressed the potential effects associated with the modifications.

In October of 2016 the Minnesota Department of Natural Resources (MN DNR) completed their Findings of Fact for a Dam Safety and Public Waters Work permit (2018-0386) applied for by the Flood Diversion Board of Authority (Diversion Authority). Based on the Finding of Fact, the MN DNR determined that the permit could not be issued for the Project as designed.

As a result of a lawsuit followed by a court-issued injunction between December 2016 and September 2017, the Governors of North Dakota and Minnesota created a joint Task Force to propose the framework for flood risk management for the Fargo-Moorhead region. A Technical Advisory Group (TAG) was subsequently created as an advisory group to the Task Force to assess components and alternatives and provide technical guidance to the Task Force. The Task Force and TAG considered several conceptual engineering designs for the project and screened out alternatives through their analysis, with the understanding that these recommendations were available for consideration by the Diversion Authority for a future permit application for flood control. A final report of their findings was released to the public in January 2018.

A number of project features have been revised as a result of the findings from the Task Force meetings. These updates have led to appreciable changes to the Project which warrant an additional Supplemental Environmental Assessment document to assess impacts. As illustrated in Figure 1, these Project updates include: modifications to the Southern Embankment alignment, minor changes to the Diversion Channel alignment, location of the Red River Structure, hydrologic analysis, and changes to project operations. Some of these topics are already addressed within the main body of the 2018 Supplemental Environmental Assessment. As a result, this appendix only serves to address any items not specifically covered in the main body of that document.

While the project goals are the essentially the same as they were prior to the Task Force meetings, changes in the dam alignment and changes in the operating plan, specifically the decision to operate with a 37-foot stage through town, make it difficult to perform an apples-to-apples comparison between pre Governors' Task Force hydraulic model results (Phase 8) and the current hydraulic model results (Phase 9). Consultation with a hydraulic engineer familiar with the project is recommended when comparing results of the two modeling efforts.

It should be noted that all elevations in this appendix are referenced to the North American Vertical Datum 1988 (NAVD 88), unless otherwise specified. Additionally, all dam embankment elevations referenced in this appendix refer to post-settlement elevations, unless otherwise specified.

2 HYDROLOGY

Inflow hydrology was originally developed during the Project's Feasibility Study and Environmental Impact Statement (FEIS). Initially, Period of Record (POR) hydrology was developed; but as the study progressed, the hydrology was revised to focus on a shorter period of record developed by an Expert Opinion Elicitation (EOE) panel. The EOE hydrology produced peak flow and balanced hydrographs that vary over time, however the design effort focused on assuring the Project would perform for the highest peak flow and volume conditions identified via the EOE panel. This hydrology is known as the Wet Cycle Hydrology, which will be referred to as the EOE/WET hydrology. The inflow hydrographs (main stem balanced hydrographs and local inflow hydrographs) required for the subsequent unsteady flow modeling efforts were developed for the EOE/WET condition.

The Governors' Task Force decision in late 2017 that the Project should use the POR hydrology instead of the EOE/WET hydrology presented challenges to the study effort. First, while POR hydrology is being used to report Project impacts in this report, USACE is still required to assess impacts based on EOE/WET hydrology. However, in acknowledgement of the Governors' Task Force findings, results based on the POR hydrology will be presented in this document. Results using the EOE/WET hydrology will be compared to the POR hydrology results as the EOE/WET hydrology results become available, which will occur after this report's publication. Second, as mentioned in the preceding paragraph, the detailed hydrology required for the unsteady flow modeling had been developed for the EOE/WET condition, not the POR. The local sponsor's consultant, the Houston-Moore Group (HMG) developed the inflow hydrographs needed for the POR unsteady flow modeling efforts. HMG's efforts are documented in the attached Technical Memorandum (Attachment 1).

It is important to note that both the EOE and POR hydrology developed up to this point do not include flood events after 2009. After project completion, USACE will carry out subsequent hydrologic analyses based on updated flow-frequency analyses at critical locations along the Red River to certify the Fargo-Moorhead Project. USACE certification of the project will rely upon the best available data, hydrologic methods and most up-to-date guidance available at the time of certification. This implies that an extended period of record will likely be used which includes flood peaks observed post-2009. As stated in Advisory Committee on Water Information Bulletin 17C (2018), "As more years of record become available at each location, the determination of flood potential may change. Thus, an estimate may be outdated a few years

after it is made." As a result of changing guidance (i.e.: Bulletin 17C) and advancements in the application of more advanced statistical techniques (i.e.: stochastic hydrology), the methodology applied to carry out flow-frequency analysis and the approach to defining the period of record adopted for certification will be evaluated and determined at the time of certification. A cursory investigation of updating the hydrology through 2017 indicates that peak flows could increase approximately 10 percent.

3 SOUTHERN EMBANKMENT FEATURES

Since the dam is located south of the Fargo-Moorhead Metropolitan Area, the dam has been called the Southern Embankment in many project documents. The Southern Embankment consists of the earthen embankment and three gated control structures, the Diversion Inlet Structure (DIS), the Wild Rice River Structure (WRRS), and the Red River Structure (RRS). Figure 2 shows the alignment of the Southern Embankment. Except for the location of the DIS, the alignment has changed from what was presented in the 2013 Supplemental Environmental Assessment. The western-most portion of the Southern Embankment has been named the Western Tieback. A portion of the Western Tieback is designed to be overtopped in the event of a significant gate failure at the gated structures. The eastern-most portion of the Southern Embankment is referred to as the Eastern Tieback and ensures that breakout flows under with-Project conditions do not exceed breakout flows under existing conditions during the Probable Maximum Flood (PMF) event.

3.1 Wind/Wave Analysis

An updated wind-wave analysis was performed due to the change in the alignment of the Southern Embankment, particularly the shift of the alignment between the DIS and the WRRS, which increases the longest fetch length. The updated analysis involves a coupled two-dimensional modeling approach for capturing both wind setup and wave growth across the staging area. Two wind speeds of 40 mph and 50 mph were considered, which roughly bound the 50% Annual Chance Exceedance (ACE) and 1% ACE wind speeds, adjusted to a 1-hour fetch-limited duration for over-water winds. These winds were considered for wind directions ranging from southeast to northwest (SE, SSE, S, SSW, SW, WSW, W, WNW, and NW) in order to capture the influence of wind from any hazardous direction across the pool. A maximum pool elevation of 924.0 feet was considered for the analysis with incorporation of the pool's sloping water surface so that wind fetch lengths are accurately captured in the model. The results of this modeling indicate that 5 feet of freeboard is sufficient to keep wave overtopping associated with 40 mph and 50 mph winds well below allowable rates of wave overtopping flow. The 50 mph wind model runs indicate a few areas along the northern-most portion of the embankment have 2% wave runup values exceeding 5 feet of freeboard; however, the estimated coincident probability of this event occurring is approximately 1.97×10^{-5} ACE (or 1 in 50,800). In the event that this rare combination of pool and wind occurs, wave overtopping is still not expected to lead to damage on the downstream slope of the embankment and initiation of dam failure is extremely remote. For additional information on the wind/wave analysis, please see *Southern Embankment Wind/Wave Analysis* (Attachment 2).

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3.2 Crest Profile

The maximum pool elevation profile plus the required freeboard, which is controlled by the results of the wind/wave analysis, determine the required crest elevation of the dam, except in the tieback reaches where overtopping will be accounted for in the design. The design elevations of the Southern Embankment crest profile are provided in Figure 2 (non-tieback reaches), Figure 3 (Western Tieback), and Figure 4 (Eastern Tieback). Between the DIS and the RRS, the dam crest will have an elevation of 929.0 feet. The gated control structures and a short reach of the embankment on either side of these structures will have a crest elevation of 931.0 feet for superiority. The portion of the Southern Embankment between the RRS and the Eastern Tieback will transition from a crest elevation of 929.0 feet just east of the RRS to a crest elevation of 931.0 feet at its southern end just prior to transitioning to the Eastern Tieback. This transition is necessary to maintain five (5) feet of freeboard above the sloping maximum pool elevation, which is produced by the PMF event. The crest profile of the tieback reaches will be described in detail in the following tieback-specific sections.

3.3 Western Tieback

The Western Tieback centerline will extend from the DIS in a southwesterly direction towards the Sheyenne River, as shown in Figure 3. The previous location of the Western Tieback assumed that a portion of Cass County Road 17 would serve as a dam embankment, but this is no longer the case. The proposed alignment of the Western Tieback does not follow an existing road. However, as proposed with the previous alignment, a portion of the Western Tieback will be constructed at the maximum pool elevation. The portion of the Western Tieback constructed at the maximum pool elevation would only be overtopped in the event of a significant gate failure at the gated structures.

Specifically, the Western Tieback crest profile will transition from 931.0 feet just southwest of the DIS down to the maximum pool elevation, which will be no greater than 924.0 feet. The crest will remain at an elevation no greater than 924.0 feet for approximately 3,800 feet in a southwesterly direction until a natural ridge is intersected. At the natural ridge the crest will rise to an elevation of 929.0 feet to again provide at least 5 feet of freeboard. The crest will remain at an elevation of 929.0 feet in a southwesterly direction until natural ground having an elevation of 929.0 feet is reached. This occurs approximately 1,200 feet west of County Road 36 (168th Avenue SE).

3.4 Eastern Tieback

The Eastern Tieback will ensure with Project breakout flows are no greater than the existing conditions breakout flows during the PMF event. The Eastern Tieback centerline, shown in Figure 4, will be located approximately 500 feet north of the Wilkin/Clay County line. This section will begin as a transition from an elevation of approximately 931.0 feet to an elevation of 926.0 feet at Highway 75. This transition will not require a raise of the Highway 75 roadway profile. Between Highway 75 and the eastern edge of the BNSF Railway railroad embankment, the Eastern Tieback will be built to an elevation of 925.9 feet. The railroad embankment elevation will not need to be altered as part of this plan. Between the eastern edge of the railroad and natural high ground to the east of Wolverton Creek, the embankment will be built to an elevation of 924.3 feet. The eastern edge of this reach will tie in to ground that is naturally at an elevation of 924.3 feet. Because the alignment will cross Wolverton Creek, three 10-ft by 10-ft box

culverts will be installed at the Wolverton Creek crossing location. The culvert sizes were selected to ensure water surface elevations do not increase for the 1% and 0.2% ACE events.

The Eastern Tieback embankment elevations were selected to allow flow to overtop during the PMF event. However, flows passing over the embankment and through the culverts during the PMF event will not be greater than the flows passing through this location under existing conditions, ensuring that PMF water surface elevations in Comstock do not increase.

3.5 Red River Structure

The updated Southern Embankment alignment changes the location of the RRS. The new location of the RRS is approximately two-thirds of a mile (straight-line distance) south of the previous location on the North Dakota side of the Red River of the North. While the location has changed, the design of the RRS is expected to be very similar to what had been proposed previously. The structure is expected to consist of three tainter gates, each having a width of 50 feet and a sill elevation of 873.0 feet.

3.6 Wild Rice River Structure

The updated Southern Embankment alignment changes the location of the WRRS. The new location of the WRRS is approximately one mile (straight-line distance) southwest of the previous location. While the location has changed, the design of the WRRS is expected to be very similar to what had been proposed previously. The structure is expected to consist of two tainter gates, each having a width of 40 feet and a sill elevation of 886.6 feet.

3.7 Local Drainage

The Southern Embankment severs existing drainage paths and the embankment itself will produce runoff. Plan view maps showing the general drainage strategy along the embankment are shown in Figure 5 (ND side) and Figure 6 (MN side). Preliminary profile figures of the drainage ditches are shown in Figure 7 through Figure 14. The locations of culverts and grade control structures are shown on both the plan view maps and profile figures. Ditch slope and cross section configuration will be similar to those typically used by local Water Resource Districts except that the size of the pool-side ditch may be larger than what is necessary for local drainage in order to provide material for the embankment. The longitudinal slope of ditches will generally be 0.05 percent, although slightly flatter and steeper slopes may be used to satisfy cut/fill needs. The bottom and side slopes of ditches will be conducive to future maintenance. In general, vegetation will suffice for erosion control, although riprap is expected to be installed at culverts, grade control structures, and other locations where erosion potential is increased.

4 PROJECT OPERATION AND IMPACTS

4.1 Operation Plan

Changes to the Southern Embankment alignment and the decision to use a 37-foot stage through town up through the 1% ACE event and a stage of 40 feet through town up through the 0.2% ACE event have resulted in modifications to the operation plan. Due to time constraints associated with the 2018 Environmental Assessment modeling, results presented in this Supplemental Environmental Assessment

are based on an approximated operations plan that does not fully incorporate all of the necessary operation plan components. Therefore, it is likely that slightly different impacts than those reported in this document will occur in future modeling that incorporates the full operations plan. The project operation plan described below is the intended full operation plan that will be incorporated into the hydraulic models prior to making any final determinations of pool levels and extents, real estate requirements, cultural impacts, control structure design, and Western Tieback and Eastern Tieback design.

During times of normal river flow (i.e., no flooding) and for all flood events where the stage at U.S. Geological Survey (USGS) Gage 05054000 - Red River of the North at Fargo, ND, would not exceed 37.0 feet (produced during a flow of 21,000 cfs): 1) the RRS and WRRS will remain completely open, and 2) the gates at the DIS will be essentially closed (local drainage ditch runoff will be allowed through the structure prior to the event). To determine if the stage would exceed 37.0 feet (flow of 21,000 cfs), the sum of the flows at USGS Gage 0505152130 (Red River of the North at Enloe, ND) and USGS Gage 05053000 (Wild Rice River near Abercrombie, ND) will be evaluated. An analysis of historical floods indicates close to a 1:1 relationship between the sum of the Enloe gage and Abercrombie gage flows and the future flow at the Fargo gage, indicating that the combined flow at these two gages is a good predictor for the flows at the Fargo gage. Therefore, operation of the RRS and WRRS will only begin when the combined flow at Enloe/Abercrombie reach 21,000 cfs. It is noted that a flow of 21,000 cfs is approximately a 5% ACE event (20-year flood) at the Fargo gage, meaning that only flow events less frequent than the 5% ACE will require operations.

On the rising limb of a typical flood hydrograph, when the total flow at the Enloe/Abercrombie gages is 21,000 cfs, the total flow into town at the same point in time will likely be between 10,000 cfs and 15,000 cfs, depending on how quickly the flows at Enloe/Abercrombie are rising and how much flow is contributed by Wolverton Creek. Historically, the travel time for peak flows from Enloe/Abercrombie to Fargo is approximately two days. Beginning gate operations before the flows into the benefitted area exceed 21,000 cfs is necessary to store water during the rising limb of the hydrograph in order to minimize downstream stage impacts.

Gate operations begin by partially closing all gates at both the RRS and WRRS to restrict flow entering the benefitted area. Flows into the benefitted area are gradually reduced during this initial time period to meet the downstream stage impacts, resulting in storage of water upstream of the dam. Flows into the benefitted area will not be reduced by more than 2,000 cfs per day to ensure the rate of stage fall in the benefitted area does not exceed the natural fall rate, as a quick stage fall may impact bank stability.

Gate flow releases are based on an algorithm that consider the flows of six rivers (Red River, Wild Rice River, Wolverton Creek, Sheyenne River, Maple River, and Rush River) and the physical storage characteristics of the staging area. This algorithm considers the flows on each of the six rivers and operational limits in order to determine the appropriate flow releases through the three gated structures necessary to meet the stage impact requirements of the Project. The portion of the algorithm that accounts for the flows and timing of the six rivers is based on a power law function in the form of $Q=aV^b$, where Q is the gate flow release, V is the storage volume, and a and b are user-defined coefficients. The user-defined coefficients are determined by simulating numerous synthetic and historic simulations and

fitting the operated hydrographs to the existing condition hydrographs at a location downstream of the diversion outlet.

A general outline of the operational targets based on Enloe/Abercrombie flows is summarized in the bullet points below. A detailed operation plan for the current Plan B alignment will be generated in the future. An example detailed project operation plan, created for the pre-Governors' Task Force alignment, is provided in Attachment 3 and shows the general organization and level of detail that will be incorporated into the detailed operation plan for the current alignment.

- Enloe/Abercrombie flow > 21,000 cfs but ≤ 39,000 cfs
  - Follow the gate flow release algorithm
    - Fargo gage: Expected stage of 37.0 feet
      - Approximately 21,000 cfs total flow into benefitted area (RRS + WRRS + Wolverton) produces an expected stage of 37.0 feet at the Fargo gage
      - Because the Project needs to ensure a stage of 37.0 feet is not exceeded for events up through the 1% ACE event for certification purposes, 39,000 cfs was selected as an upper end estimate of the 1% ACE flow. A preliminary investigation into the hydrology indicated that an increase of approximately 10% in the 1% ACE flow could occur as a result of incorporating the large 2010 and 2011 floods into the analysis that occurred after the original hydrology was developed. A final hydrologic investigation will be conducted to determine the 1% ACE flow after the Project is constructed and is in the process of being certified. Methodology for determining the 1% ACE flow will be determined based on the best hydrologic methods and USACE guidance effective at that time.
    - DIS: Maximum flow of 20,000 cfs. DIS gates will be operated to limit flow increase to 2,000 cfs per hour until a sufficient flow depth in the Diversion Channel is realized. This will minimize the potential for erosion in the Diversion Channel.
    - Pool Elevation: Maximum water surface elevation of 921.0 feet at the southwestern end of the Western Tieback constructed at the maximum pool elevation
- Enloe/Abercrombie flow > 39,000 cfs but ≤ 64,000 cfs
  - Follow the gate flow release algorithm
    - Fargo gage: Expected stage between 37.0 feet and 40.0 feet
      - 37.0 feet is target benefitted-area stage for 39,000 cfs Enloe/Abercrombie flow and 40.0 feet is the target benefitted-area stage for 64,000 cfs Enloe/Abercrombie flow; linearly interpolate for Enloe/Abercrombie flow between 39,000 cfs and 64,000 cfs
        - Approximately 21,000 cfs total flow into benefitted area (RRS + WRRS + Wolverton) produces an expected stage of 37.0 feet at the Fargo gage
        - Approximately 27,000 cfs total flow into benefitted area (RRS + WRRS + Wolverton) produces an expected stage of 40.0 feet at the Fargo gage
    - Pool Elevation: Maximum water surface elevation of 922.5 feet at the southwestern end of the Western Tieback constructed at the maximum pool elevation
    - DIS: Maximum flow between 20,000 cfs and 25,000 cfs. DIS gates will be operated to limit flow increase to 2,000 cfs per hour until a sufficient flow depth in the Diversion Channel

is realized. This will minimize the potential for channel erosion.

- 20,000 cfs is the expected maximum for 39,000 cfs Enloe/Abercrombie flow and 25,000 cfs is the expected maximum for 64,000 cfs Enloe/Abercrombie flow; linearly interpolate for Enloe/Abercrombie flow between 39,000 cfs and 64,000 cfs
- An unusually high-volume flood could require a DIS flow greater than 25,000 cfs to maintain a stage of 40.0 feet at the Fargo gage and prevent the pool from rising above 922.5 feet

- Enloe/Abercrombie flow > 64,000 cfs
  - Gate flow release algorithm no longer applies
    - Fargo gage: Maximum stage of 40.0 feet until pool reaches 923.5 feet at the at the southwestern end of the Western Tieback constructed at the maximum pool elevation
    - DIS: Maximum flow of 25,000 cfs until pool exceeds 922.5 feet; increase opening of gates until gates are fully open to keep pool level ≤ 923.5 feet and Fargo gage ≤ 40.0 feet as long as possible
      - Using the 0.2% ACE event balanced hydrograph and the PMF hydrograph as guides for estimating hydrographs for intermediate events, an event with a peak flow of between 90,000 cfs and 100,000 cfs with a 15-day volume of approximately 1,600,000 acre-feet would generate a maximum pool elevation of 923.5 to 924.0 feet at the Western Tieback without requiring a stage of > 40.0 feet at the Fargo gage
    - RRS and WRRS gates will be opened as needed to maintain a maximum pool elevation of 923.5 feet; the Fargo gage is allowed to exceed 40.0 feet
      - The PMF hydrograph, having a peak flow of 204,000 cfs and a 15-day volume of approximately 3,876,000 acre-feet, would generate a maximum pool elevation of 923.5 to 924.0 feet at the Western Tieback

An evacuation order will be issued for the Fargo-Moorhead urban area as the pool approaches an elevation of 923.5 feet. To prevent the pool elevation from exceeding 923.5 feet, the RRS and WRRS gates would be opened to maintain a pool elevation of 923.5 feet and stages would rise above 40.0 feet at the Fargo gage resulting in flooding of the Fargo-Moorhead urban area. There is sufficient flow capacity at the gated structures and tieback embankments to keep the maximum pool level at or below 923.5 feet up through the PMF event. It is noted that pool elevations are referenced at the southwestern (upstream) end of the Western Tieback constructed at the maximum pool elevation. Figure 15 shows the maximum water surface elevations within the pool during the PMF event. As shown in Figure 15, the pool is not a flat pool; generally, water surface elevations increase going east from the Western Tieback and going south from the dam. For example, the pool increases approximately 2.6 feet in elevation between the dam embankment near the RRS and the Cass/Richland County line along the Red River.

After the flood peak has passed and the pool begins to be drawn down, RRS and WRRS gate opening changes will be limited to ensure the rate of stage fall in the Staging Area is in line with the natural rate of stage fall, which reduces the potential for bank instability and fish stranding. The operation plan limits the reduction in pool stage to no more than 2 feet per day, which is the historically-observed rate at USGS gage 05051522 – Red River of the North at Hickson, ND.

4.2 Stage Difference

It should be noted that this appendix only shows figures comparing the 'Existing Conditions' and 'With Project' conditions based on the assumption that emergency measures are fully in place, as required by the MN DNR. Even though those comparisons are made, USACE is still required to evaluate the 'Existing Conditions' and 'With Project' conditions based on the assumption that emergency measures are not in place. A portion of these "without emergency measures" comparisons are described in the tables at the end of the appendix and will be accompanied by their corresponding figures by the time the Draft Supplemental Environmental Assessment is released. It should be noted that all figures contained in this appendix represent the "With Emergency Measures" condition. This condition equates to a levee crest elevation equivalent to a water surface profile of 44 feet.

Figure 16 through Figure 20 illustrate the floodplain and benefitted areas for each of the 10%, 5%, 2%, 1%, and 0.2% ACE events. For each figure, the dark blue areas represent regions that will be inundated under both the "With Project" and "Without Project" conditions. The light blue areas characterize the regions that would be dry in the "Without Project" conditions, but will now be inundated as a result of the Project. Finally, the green areas describe regions that would be inundated under the "Without Project" conditions, but will remain dry under the "With Project" conditions for that particular event. It should be noted that each of these boundaries does not quantify the depth of inundation, rather only the footprint of inundation itself.

Similar to Figure 16 through Figure 20, Figure 21 through Figure 25 describe the floodplain and benefitted areas for each of the 10%, 5%, 2%, 1%, and 0.2% ACE events, but also annotates how flow is moving throughout the system while the Project is operating. Like Figure 16 through Figure 20, each of the boundaries illustrated in Figure 21 through Figure 25 does not quantify the depth of inundation, but rather only the footprint of inundation itself.

Stage impact tables comparing the 'Existing Conditions' water surface elevations to the 'With Project' water surface elevations have been generated at 17 different locations throughout the basin for the 10%, 5%, 2%, 1%, and 0.2% ACE events. The Project is operated with a goal of minimizing downstream impacts. The results of this analysis are included in Table 1 to Table 5. It should be noted that POR hydrology was used to create these comparisons.

Acronyms and symbols were used in each of the tables. Each of these acronyms and symbols are listed below:

- EX = Existing conditions
- EM = Emergency Measures
- WP = With Project
- Δ = Difference between

Figure 26 through Figure 30 represent the maximum total depth difference between the "With Project" and "Without Project" water surface elevations for each of the 10%, 5%, 2%, 1%, and 0.2% ACE events. In each of these figures, the red polygon symbolizes the analysis boundary, which represents 0.1 foot

inundation difference boundary between the "With Project" and "Without Project" depths. Differences in maximum water surface elevation depth have been grouped into 6 categories:

- Clear: < 0.1 feet
- Blue: 0.1 feet – 0.5 feet
- Green: 0.5 feet – 1.0 foot
- Yellow: 1 foot – 2.0 feet
- Orange: 2.0 feet – 5.0 feet
- Red: > 5.0 feet

5 ASSUMPTIONS

The following is a list of assumptions that have been made in the hydraulic model development that will be addressed in refined hydraulic models produced after the 2018 Supplemental Environmental Assessment and during detailed design.

- Approximated operating plan does not provide significantly different water surface elevations compared to final proposed operating plan
- Pool water surface elevation is measured at the southwestern (upstream) end of the Western Tieback constructed at the maximum pool elevation
- Five (5) feet of freeboard is required along the entire embankment
- Eastern Tieback needs to extend across Wolverton Creek
- Western Tieback will not convey flow under max pool conditions
- DIS, WRRS, and RRS gates have sufficient capacity to keep pool at an elevation of 923.5 feet during the PMF event

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TABLES

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Table 1: 10% ACE Water Surface Elevation and Impact Table (POR Hydrology)

Location Name	WP no EM	EX no EM	ΔWP-EX	WP with EM	EX with EM	ΔWP-EX
Drayton, ND (30 mi. to Canada)	797.41	797.40	0.01	797.42	797.41	0.01
Oslo, MN	810.96	810.97	-0.01	810.97	810.96	0.01
Grand Forks, ND	824.53	824.51	0.02	824.55	824.52	0.03
Thompson, ND	835.70	835.66	0.04	835.72	835.69	0.03
Climax, MN	843.45	843.42	0.03	843.48	843.44	0.04
Nielsville, MN	847.87	847.84	0.03	847.90	847.87	0.03
Shelly, MN	854.41	854.37	0.04	854.43	854.40	0.03
Halstad, MN	862.77	862.73	0.04	862.79	862.75	0.04
Hendrum, MN	866.66	866.64	0.02	866.69	866.66	0.03
Perley, MN	872.54	872.58	-0.04	872.57	872.60	-0.03
Georgetown, MN	878.40	878.46	-0.06	878.43	878.48	-0.05
Fargo/Moorhead (Fargo Gage)	895.60	895.78	-0.18	895.64	895.82	-0.18
Western Tieback	913.78	-	-	913.78	-	-
Upstream of Dam, Wild Rice River	912.13	912.13	0.00	912.13	912.13	0.00
Upstream of Dam, Red River	907.84	907.78	0.06	907.84	907.79	0.05
County Line @ Red River	910.79	910.76	0.03	910.80	910.76	0.04
County Line @ Wild Rice River	916.64	916.66	-0.02	916.64	916.66	-0.02

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Table 2: 5% ACE Water Surface Elevation and Impact Table (POR Hydrology)

Location Name	WP no EM	EX no EM	ΔWP-EX	WP with EM	EX with EM	ΔWP-EX
Drayton, ND (30 mi. to Canada)	799.37	799.31	0.06	799.38	799.31	0.07
Oslo, MN	812.33	812.29	0.04	812.33	812.29	0.04
Grand Forks, ND	827.96	827.80	0.16	827.97	827.81	0.16
Thompson, ND	840.61	840.30	0.31	840.63	840.31	0.32
Climax, MN	849.29	848.92	0.37	849.31	848.93	0.38
Nielsville, MN	853.56	853.18	0.38	853.59	853.20	0.39
Shelly, MN	859.46	859.16	0.30	859.48	859.17	0.31
Halstad, MN	866.38	866.10	0.28	866.40	866.12	0.28
Hendrum, MN	869.86	869.49	0.37	869.88	869.51	0.37
Perley, MN	875.41	875.28	0.13	875.43	875.30	0.13
Georgetown, MN	880.72	880.59	0.13	880.73	880.61	0.12
Fargo/Moorhead (Fargo Gage)	899.21	899.43	-0.22	899.28	899.53	-0.25
Western Tieback	913.78	-	-	913.78	-	-
Upstream of Dam, Wild Rice River	915.29	915.06	0.23	915.29	915.06	0.23
Upstream of Dam, Red River	910.86	910.86	0.00	910.88	910.88	0.00
County Line @ Red River	913.65	913.63	0.02	913.66	913.63	0.03
County Line @ Wild Rice River	920.35	920.35	0.00	920.35	920.35	0.00

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Table 3: 2% ACE Water Surface Elevation and Impact Table (POR Hydrology)

Location Name	WP no EM	EX no EM	ΔWP-EX	WP with EM	EX with EM	ΔWP-EX
Drayton, ND (30 mi. to Canada)	801.18	801.18	0.00	801.19	801.19	0.00
Oslo, MN	813.08	813.06	0.02	813.08	813.06	0.02
Grand Forks, ND	830.80	830.68	0.12	830.81	830.69	0.12
Thompson, ND	844.11	844.15	-0.04	844.12	844.21	-0.09
Climax, MN	853.22	853.39	-0.17	853.24	853.46	-0.22
Nielsville, MN	857.27	857.51	-0.24	857.29	857.58	-0.29
Shelly, MN	862.45	862.69	-0.24	862.46	862.76	-0.30
Halstad, MN	867.26	867.46	-0.20	867.27	867.49	-0.22
Hendrum, MN	871.04	871.45	-0.41	871.05	871.50	-0.45
Perley, MN	876.63	876.78	-0.15	876.64	876.80	-0.16
Georgetown, MN	881.59	881.46	0.13	881.60	881.49	0.11
Fargo/Moorhead (Fargo Gage)	899.62	901.99	-2.37	899.71	902.41	-2.70
Western Tieback	919.71	913.50	6.21	919.71	913.50	6.21
Upstream of Dam, Wild Rice River	919.85	915.99	3.86	919.85	915.99	3.86
Upstream of Dam, Red River	919.81	912.90	6.91	919.81	912.92	6.89
County Line @ Red River	920.55	916.22	4.33	920.55	916.22	4.33
County Line @ Wild Rice River	921.82	921.78	0.04	921.82	921.78	0.04

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Table 4: 1% ACE Water Surface Elevation and Impact Table (POR Hydrology)

Location Name	WP no EM	EX no EM	ΔWP-EX	WP with EM	EX with EM	ΔWP-EX
Drayton, ND (30 mi. to Canada)	802.36	802.33	0.03	802.36	802.33	0.03
Oslo, MN	813.53	813.51	0.02	813.53	813.52	0.01
Grand Forks, ND	832.77	832.71	0.06	832.78	832.72	0.06
Thompson, ND	846.73	846.80	-0.07	846.75	846.78	-0.03
Climax, MN	856.78	856.92	-0.14	856.81	856.88	-0.07
Nielsville, MN	860.82	860.97	-0.15	860.84	860.92	-0.08
Shelly, MN	864.91	865.03	-0.12	864.93	864.99	-0.06
Halstad, MN	868.13	868.25	-0.12	868.14	868.22	-0.08
Hendrum, MN	872.40	872.61	-0.21	872.41	872.57	-0.16
Perley, MN	877.21	877.29	-0.08	877.21	877.26	-0.05
Georgetown, MN	881.93	881.81	0.12	881.93	881.79	0.14
Fargo/Moorhead (Fargo Gage)	899.65	903.29	-3.64	899.74	904.15	-4.41
Western Tieback	920.95	913.88	7.07	920.95	913.89	7.06
Upstream of Dam, Wild Rice River	921.02	916.18	4.84	921.02	916.18	4.84
Upstream of Dam, Red River	921.11	914.10	7.01	921.11	914.12	6.99
County Line @ Red River	922.01	918.27	3.74	922.01	918.28	3.73
County Line @ Wild Rice River	922.49	922.28	0.21	922.49	922.28	0.21

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Table 5: 0.2% ACE Water Surface Elevation and Impact Table (POR Hydrology)

Location Name	WP no EM	EX no EM	ΔWP-EX	WP with EM	EX with EM	ΔWP-EX
Drayton, ND (30 mi. to Canada)	804.04	803.95	0.09	804.04	803.87	0.17
Oslo, MN	814.33	814.27	0.06	814.33	814.21	0.12
Grand Forks, ND	836.99	836.72	0.27	836.98	836.40	0.58
Thompson, ND	850.01	849.95	0.06	849.97	849.72	0.25
Climax, MN	862.65	862.57	0.08	862.56	862.05	0.51
Nielsville, MN	866.53	866.47	0.06	866.43	865.93	0.50
Shelly, MN	868.43	868.39	0.04	868.35	867.99	0.36
Halstad, MN	870.57	870.61	-0.04	870.48	870.26	0.22
Hendrum, MN	874.61	874.73	-0.12	874.56	874.35	0.21
Perley, MN	878.12	878.24	-0.12	878.09	878.08	0.01
Georgetown, MN	882.79	882.75	0.04	882.75	882.57	0.18
Fargo/Moorhead (Fargo Gage)	902.74	905.48	-2.74	902.71	907.31	-4.60
Western Tieback	921.56	914.48	7.08	922.40	914.49	7.91
Upstream of Dam, Wild Rice River	921.71	916.65	5.06	922.53	916.66	5.87
Upstream of Dam, Red River	921.93	915.70	6.23	922.75	915.74	7.01
County Line @ Red River	923.56	922.32	1.24	923.91	922.32	1.59
County Line @ Wild Rice River	923.93	923.86	0.07	923.96	923.86	0.10

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FIGURES

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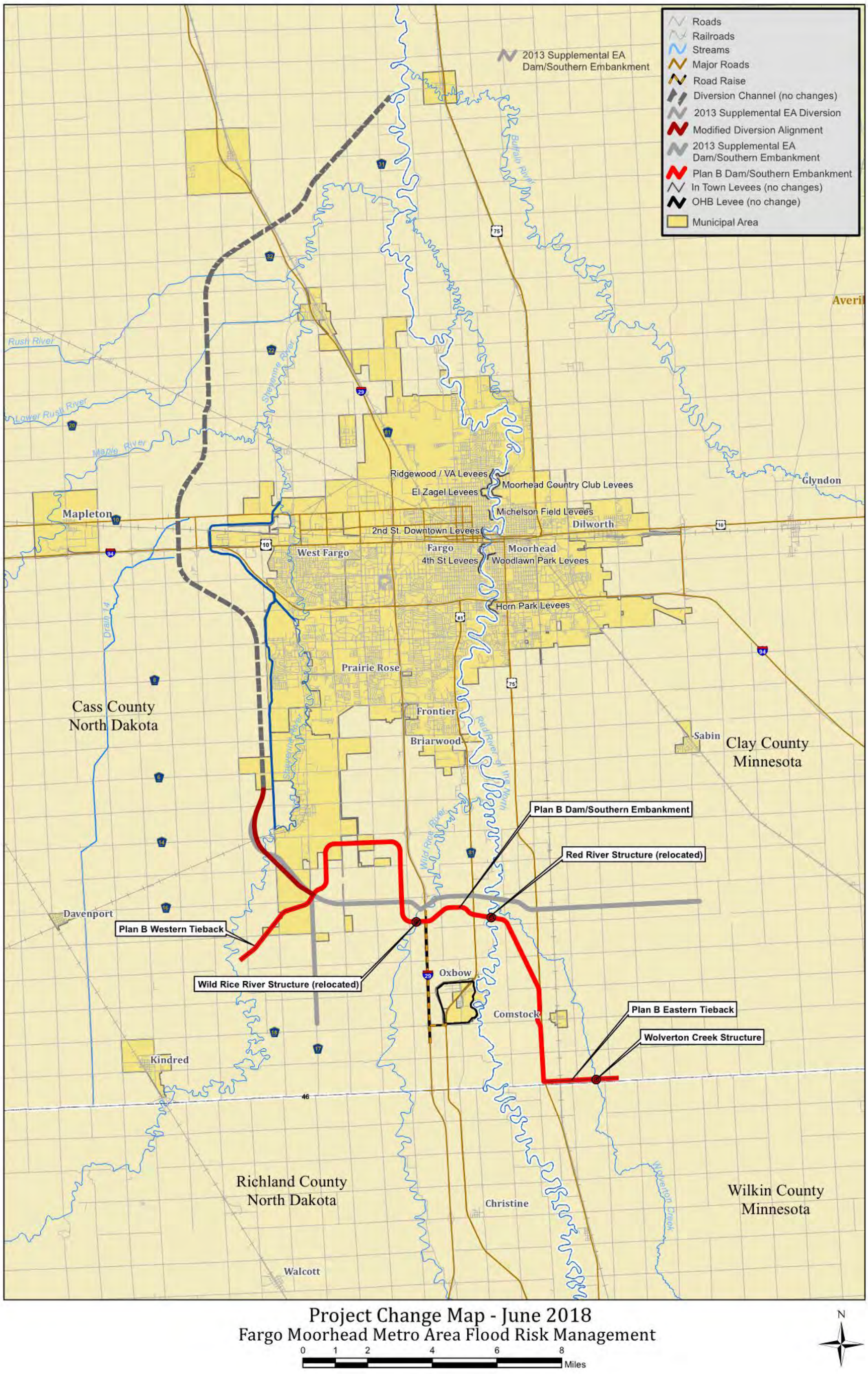

Figure 1: Project Change Map

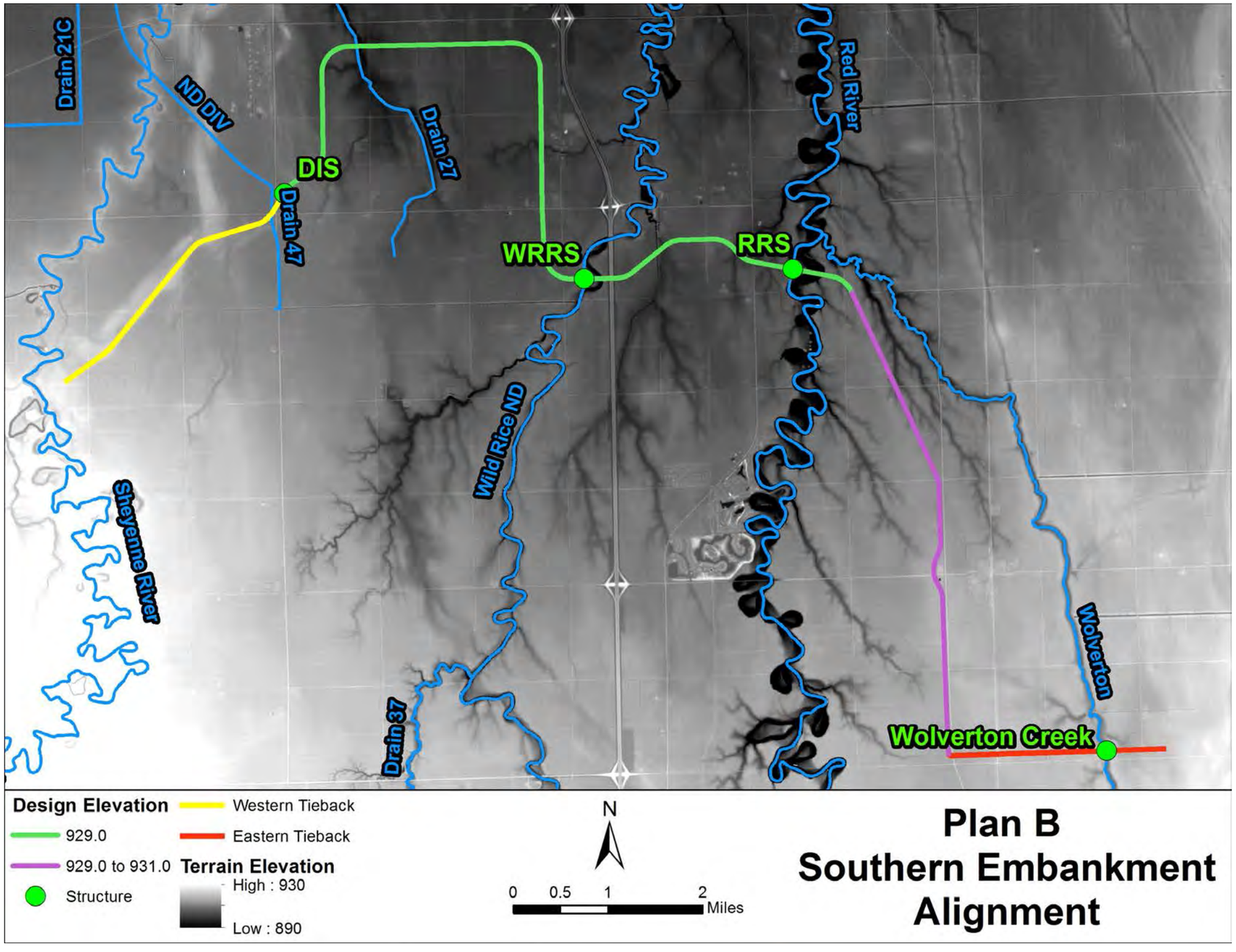

Figure 2. Southern Embankment Preliminary Design Schematic

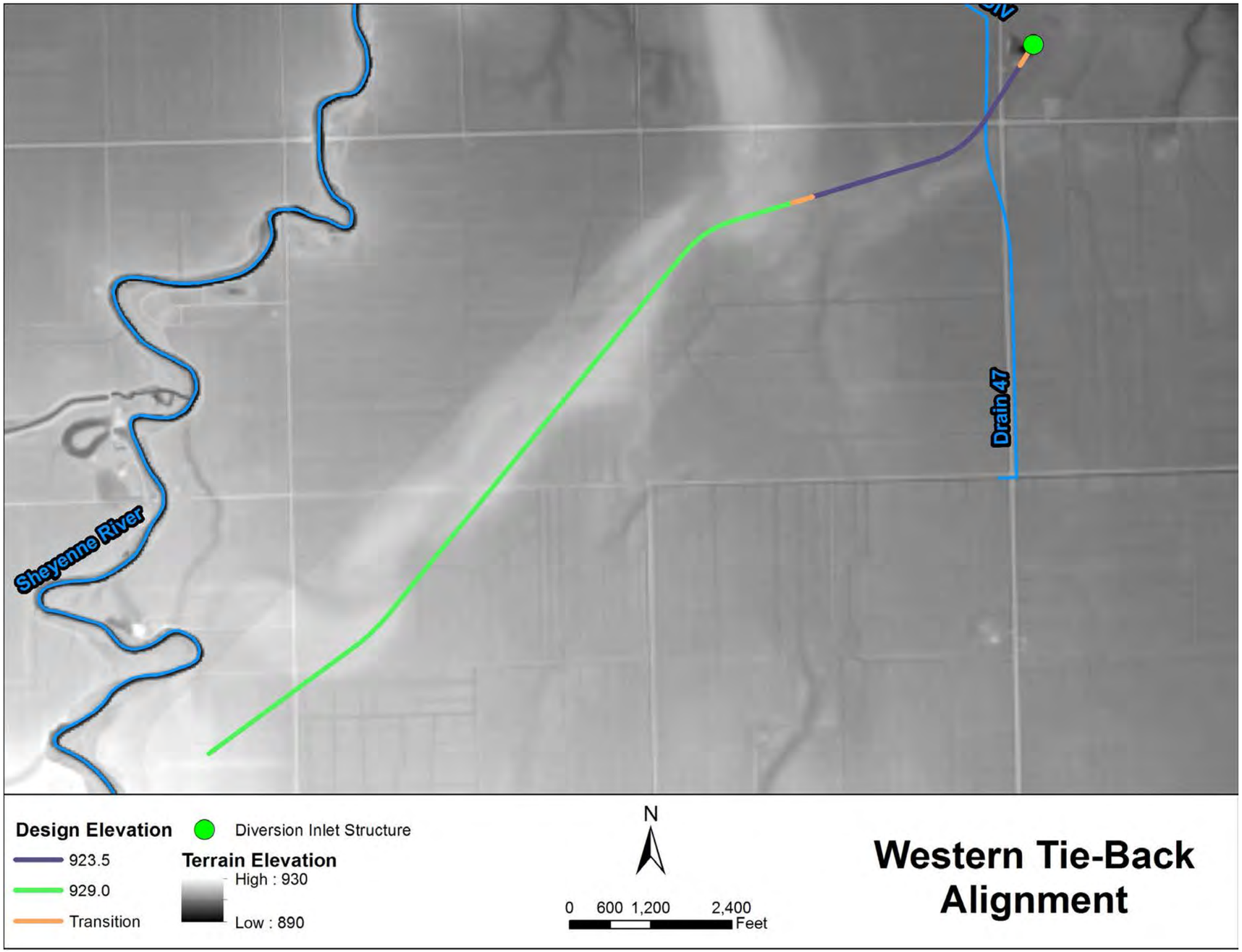

Figure 3. Western Tieback Preliminary Design Schematic

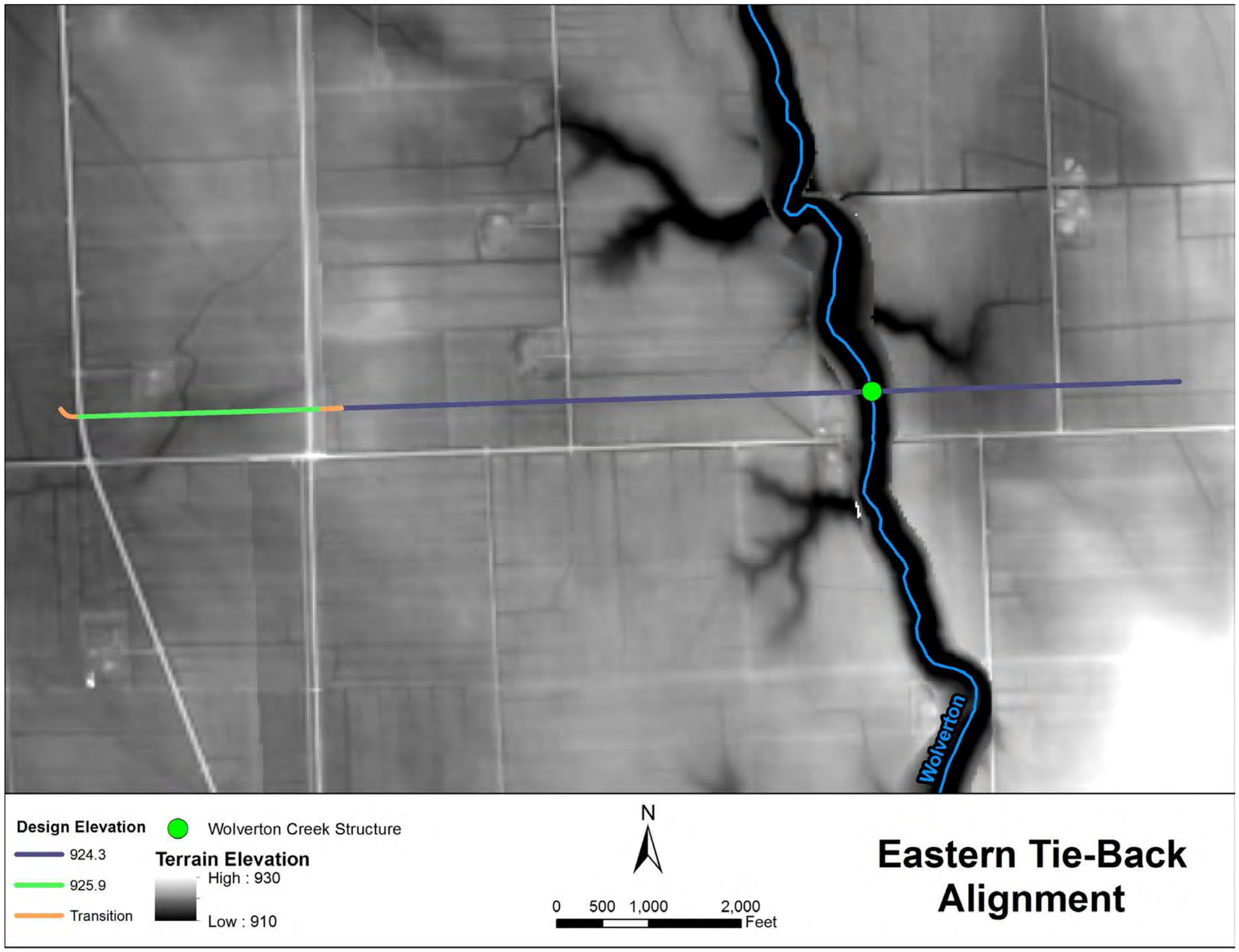

Figure 4. Eastern Tieback Preliminary Design Schematic

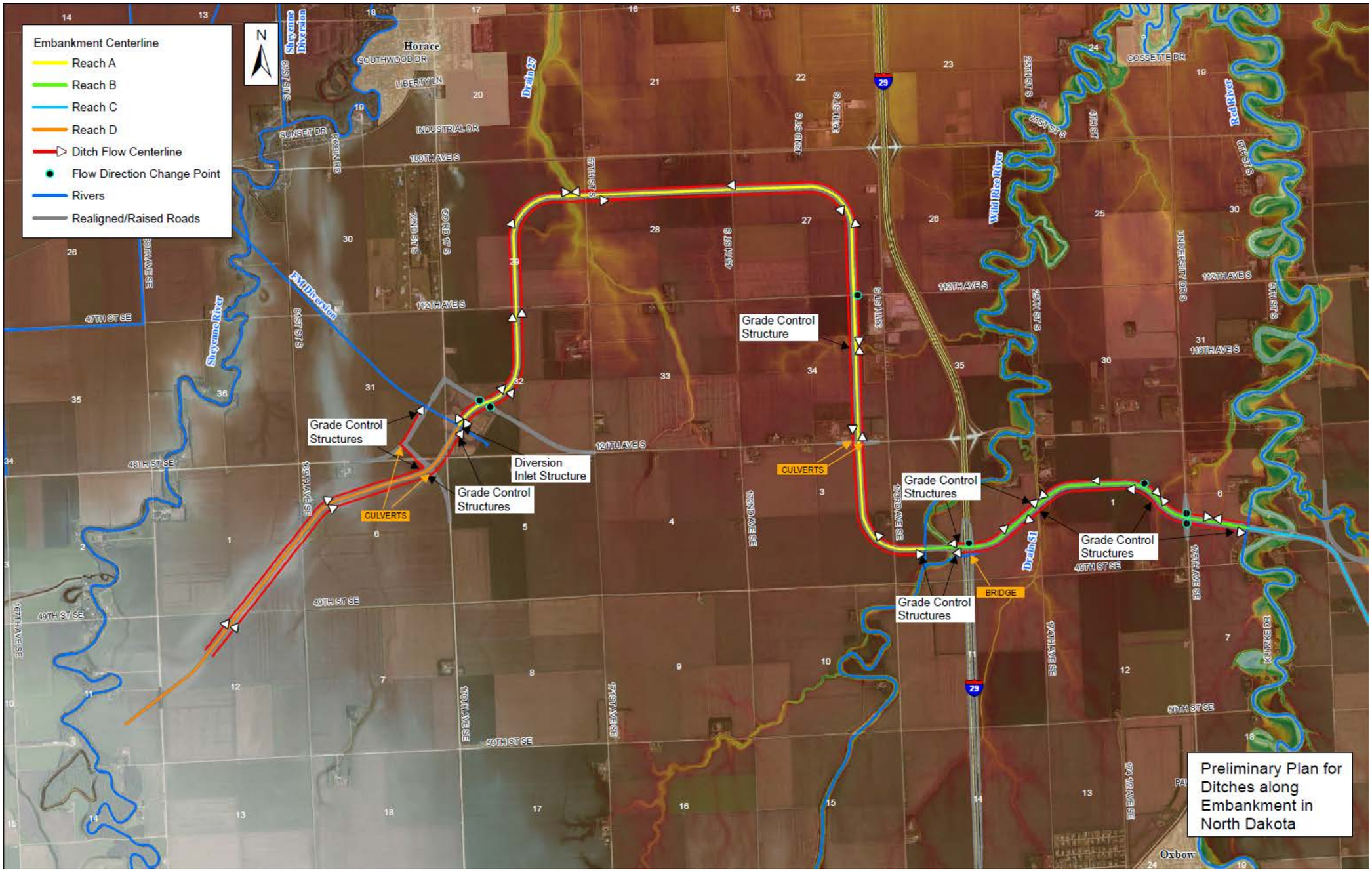

Figure 5. Local Drainage along Southern Embankment in North Dakota

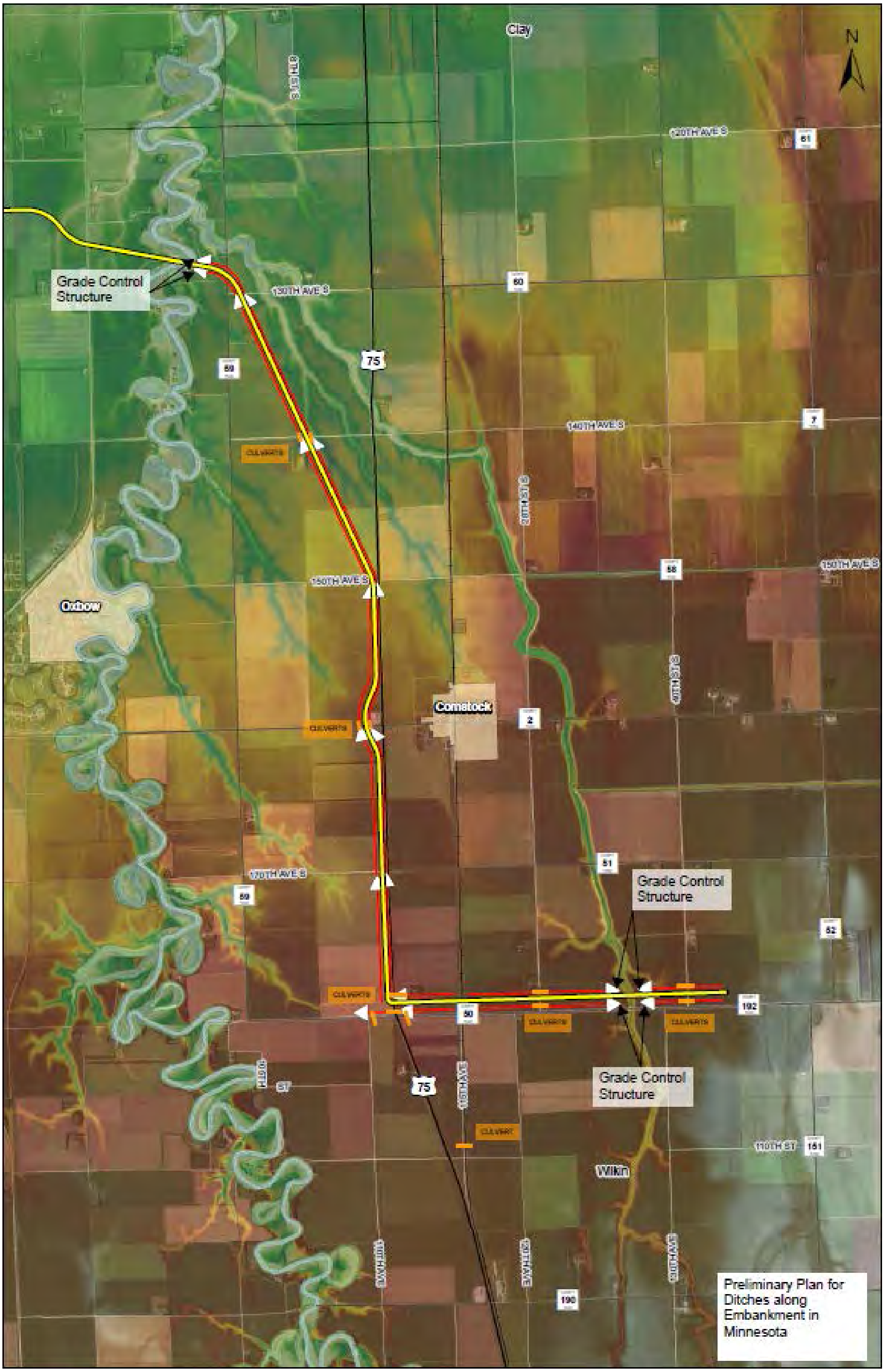

Figure 6. Local Drainage along Southern Embankment in Minnesota

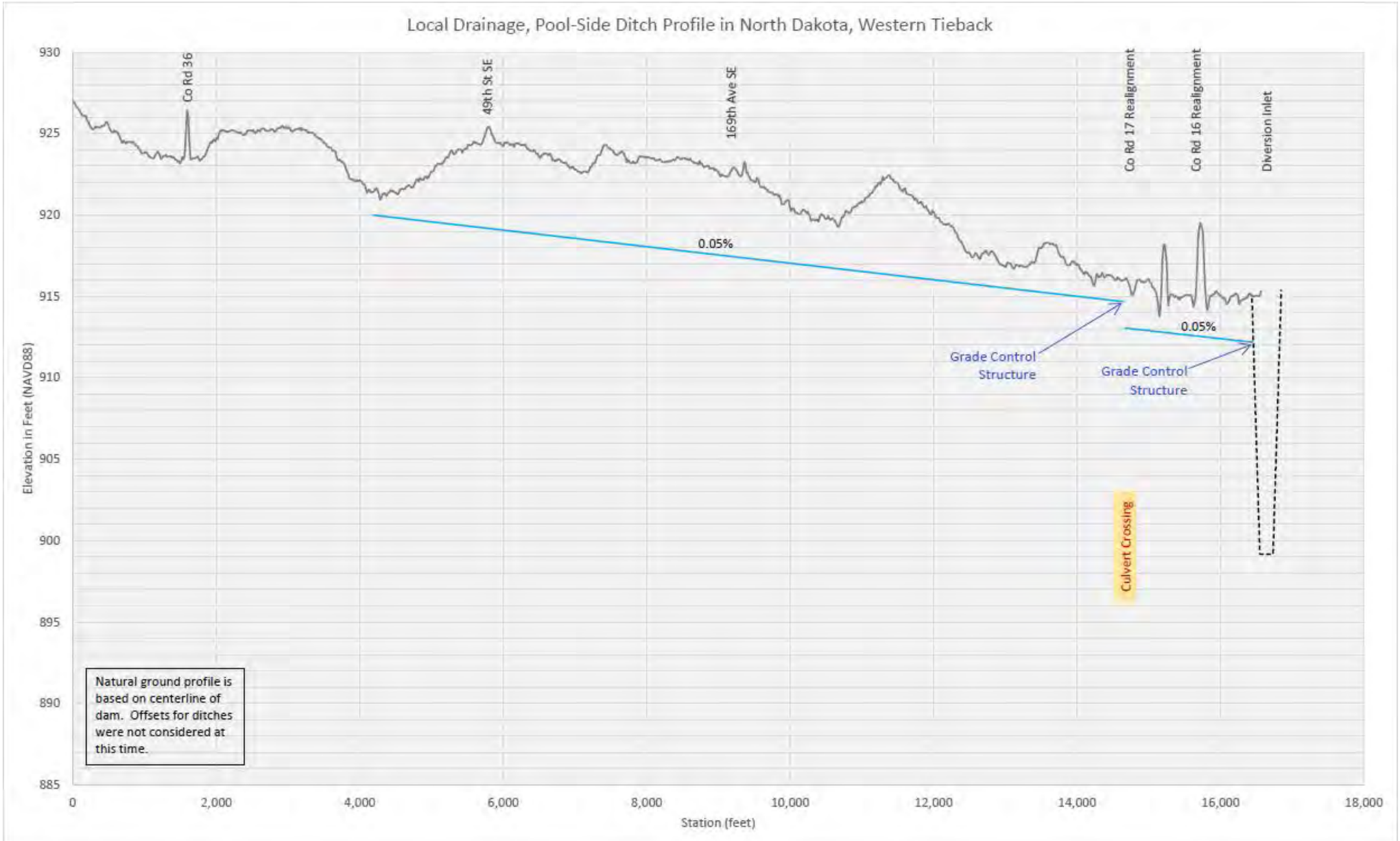

Figure 7. Pool-Side Ditch Profile in North Dakota, Western Tieback

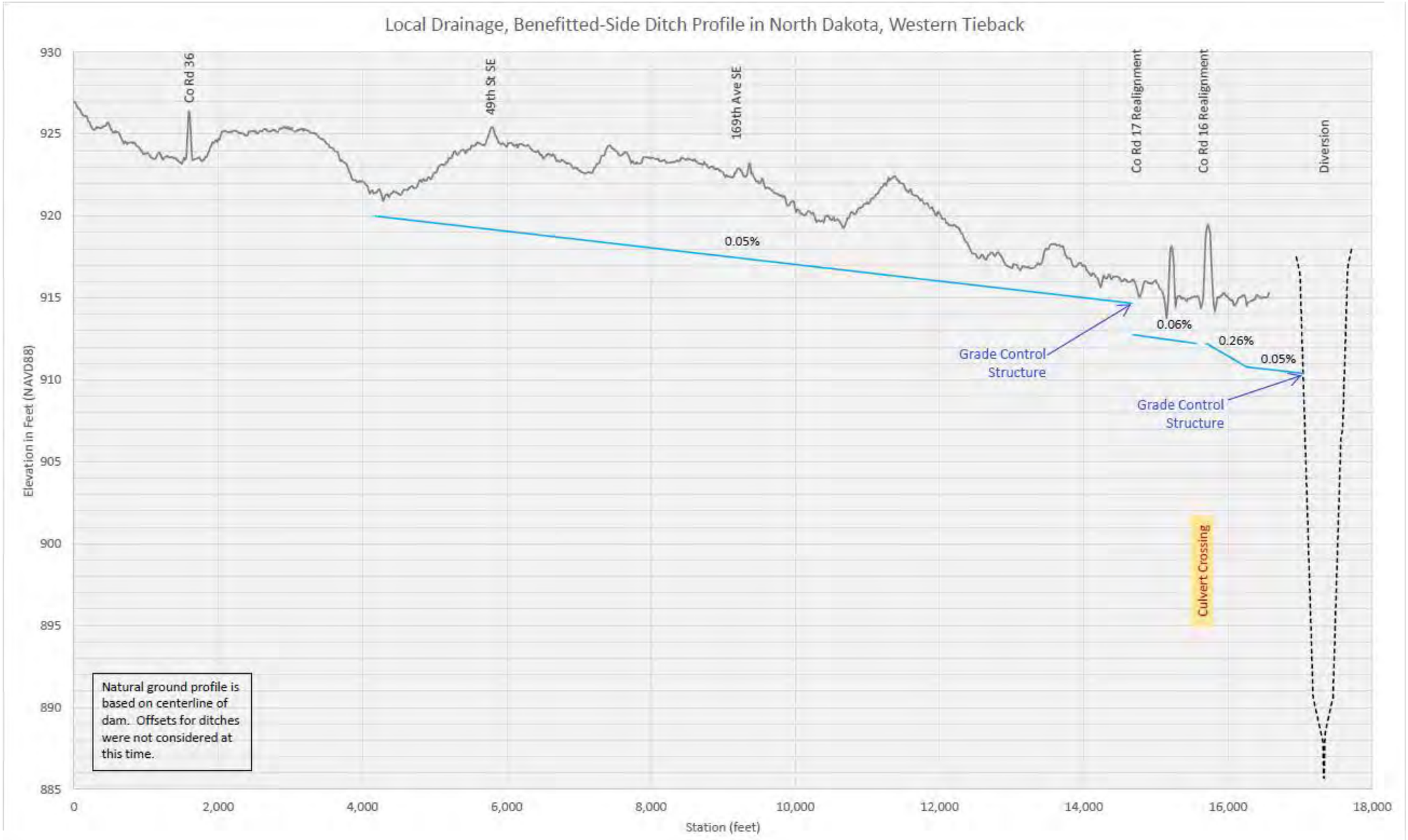

Figure 8. Benefitted-Side Ditch Profile in North Dakota, Western Tieback

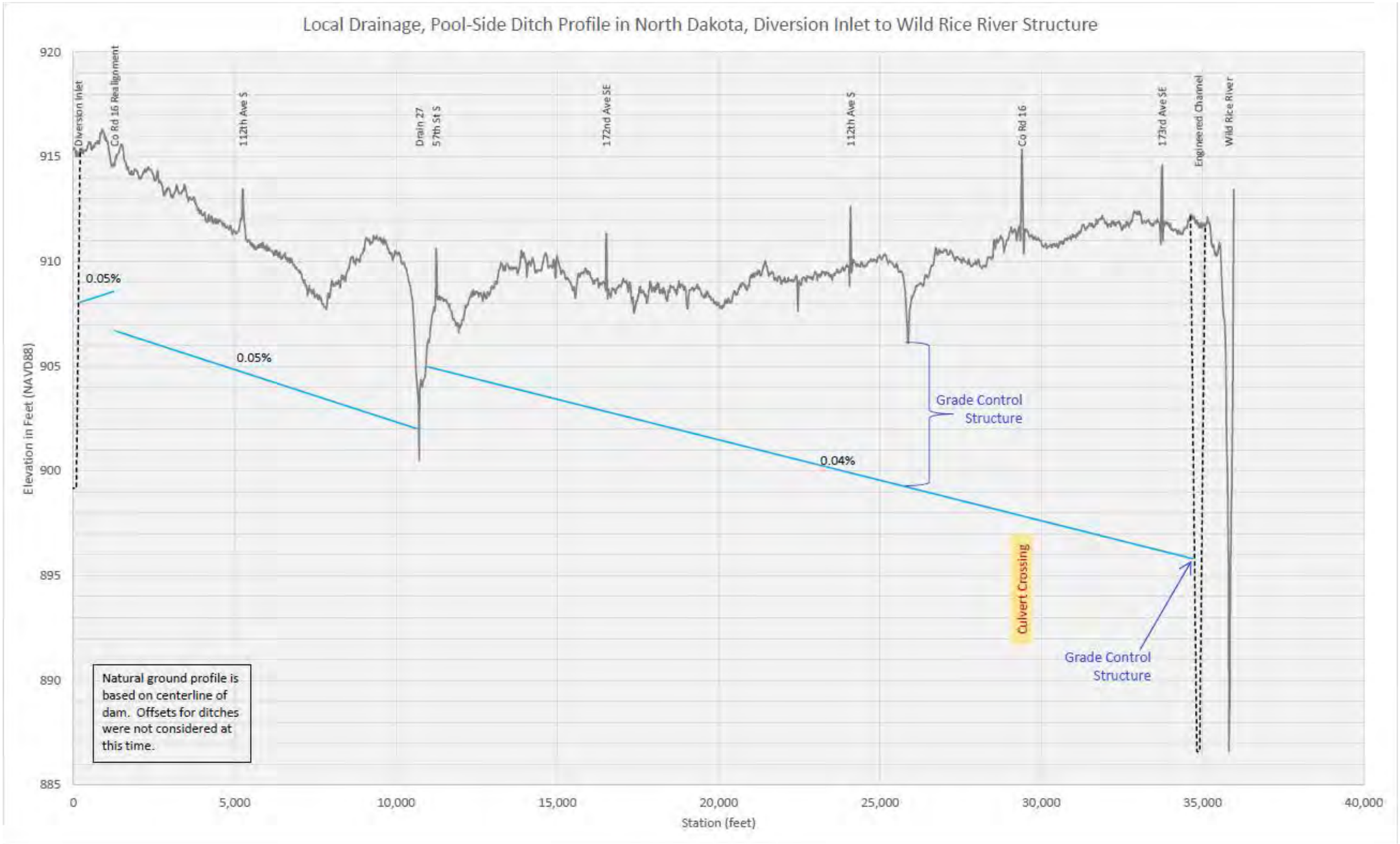

Figure 9. Pool-Side Ditch Profile in North Dakota, Diversion Inlet to Wild Rice River Structure

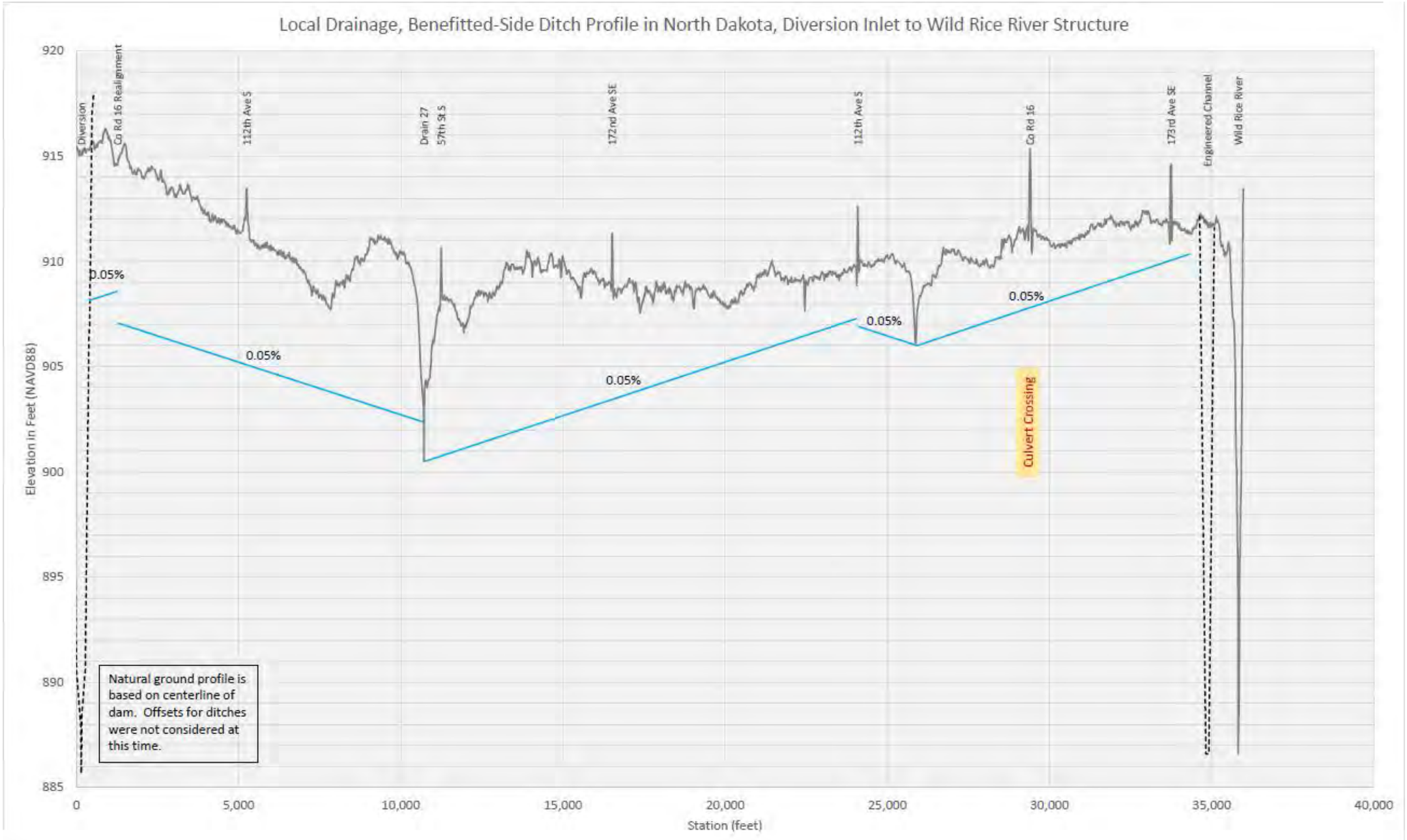

Figure 10. Benefitted-Side Ditch Profile in North Dakota, Diversion Inlet to Wild Rice River Structure

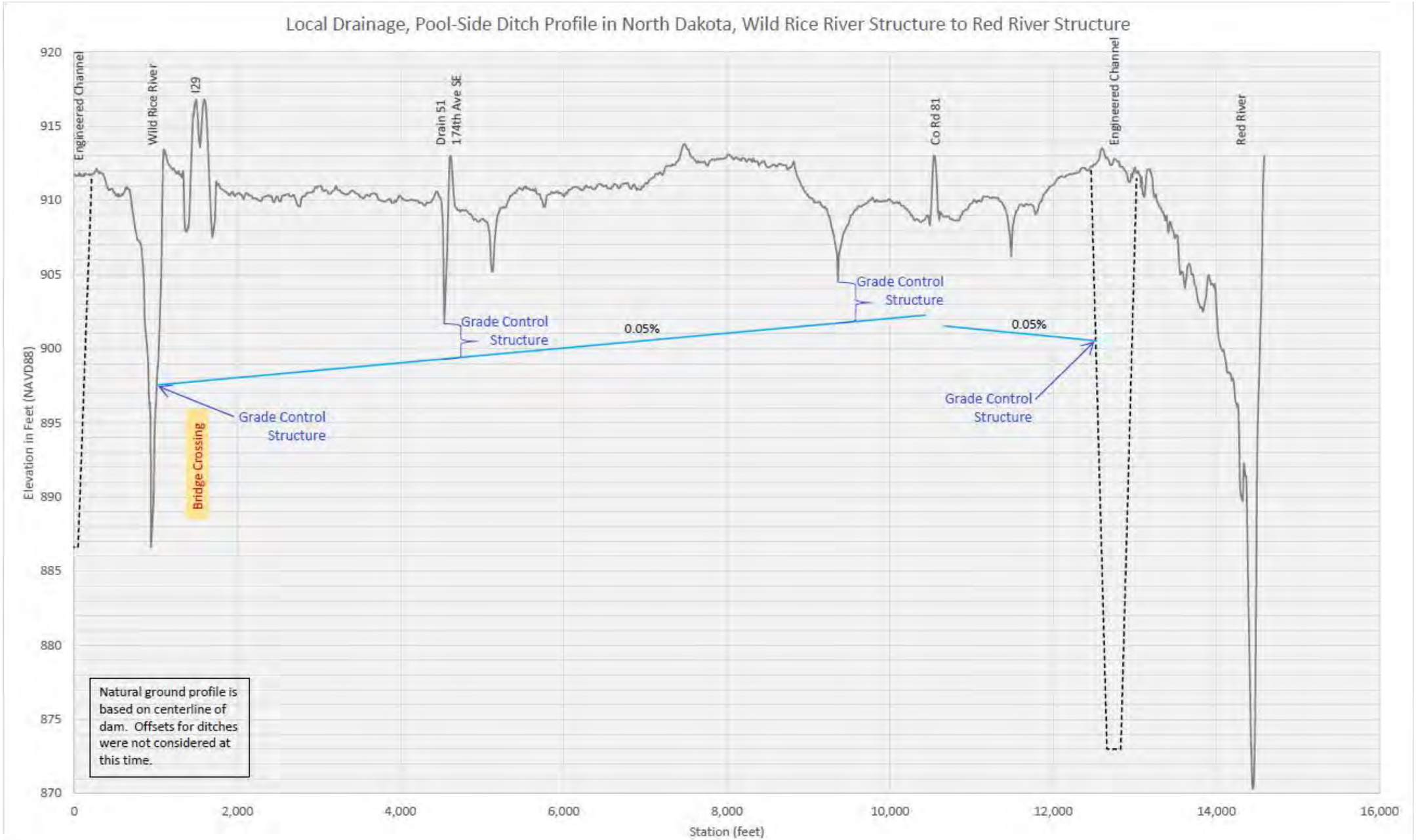

Figure 11. Pool-Side Ditch Profile in North Dakota, Wild Rice River Structure to Red River Structure

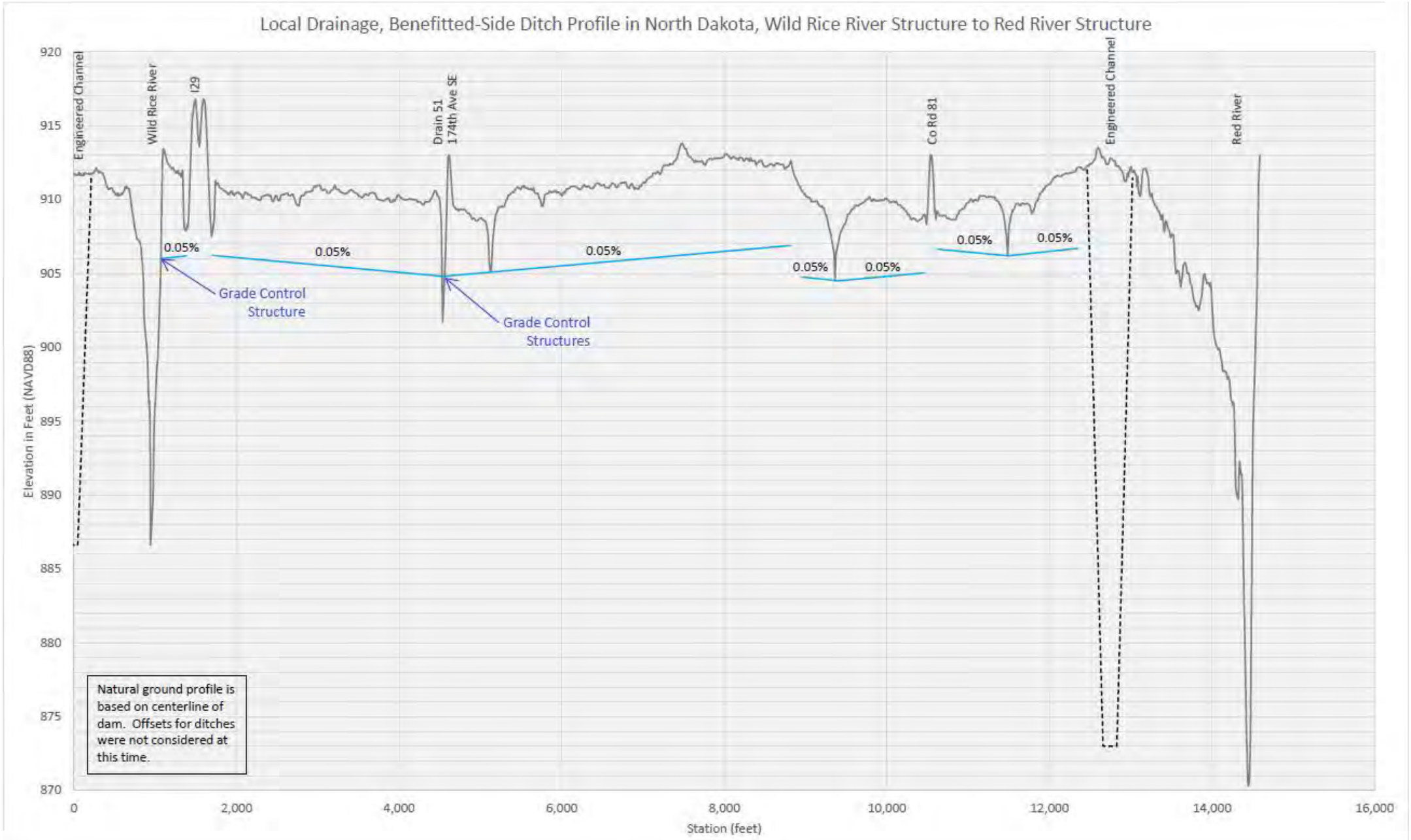

Figure 12. Benefitted-Side Ditch Profile in North Dakota, Wild Rice River Structure to Red River Structure

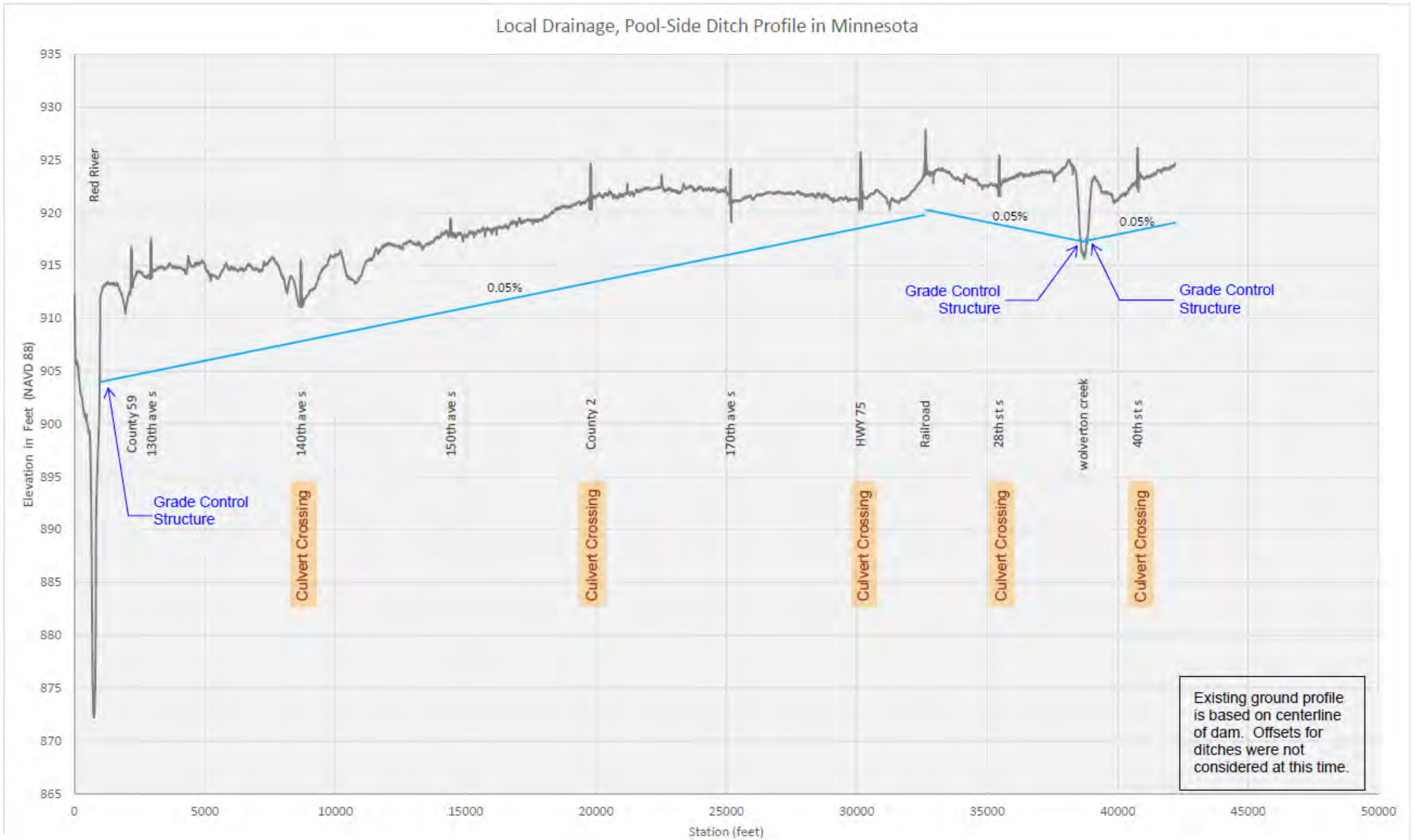

Figure 13. Pool-Side Ditch Profile in Minnesota

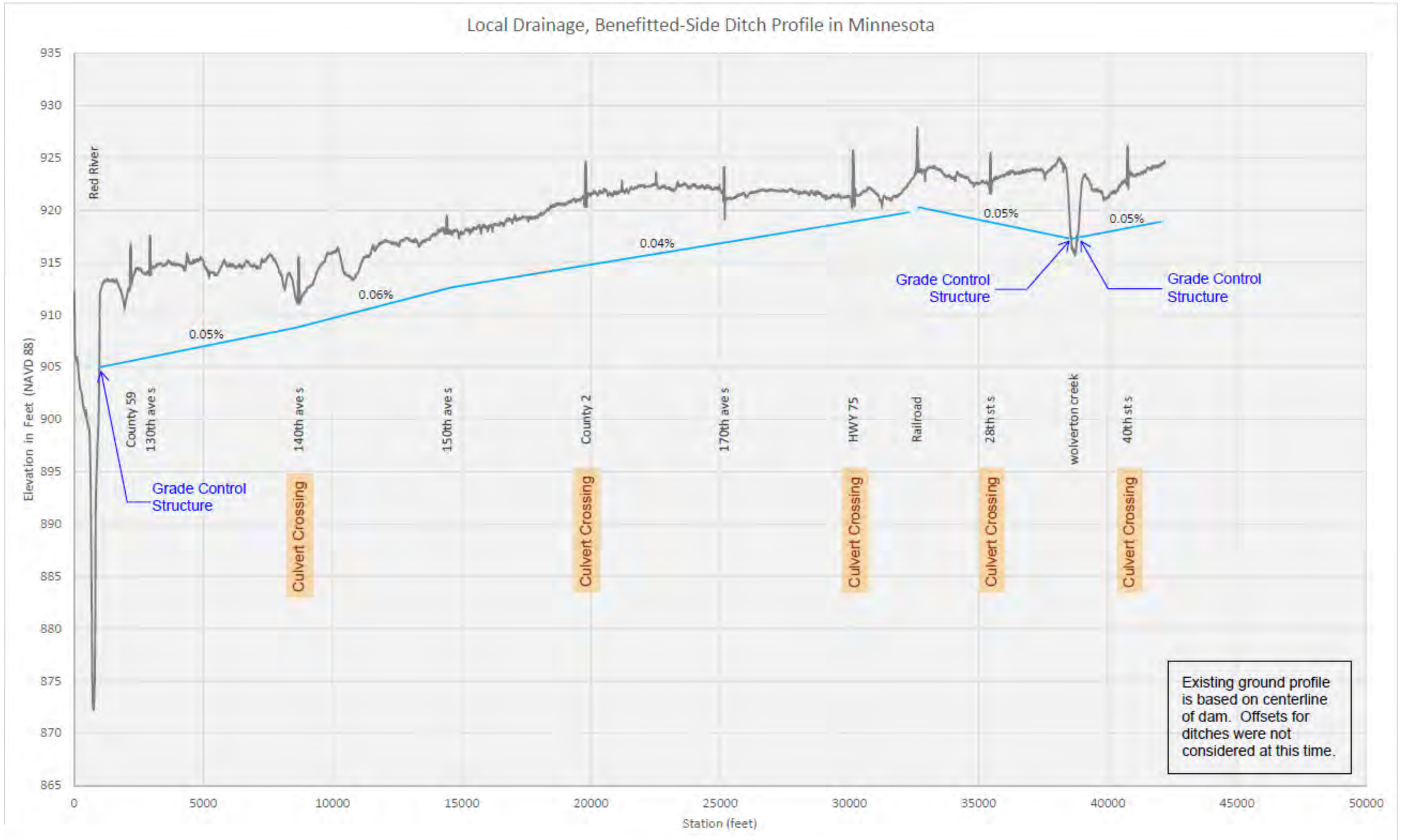

Figure 14. Benefitted-Side Ditch Profile in Minnesota

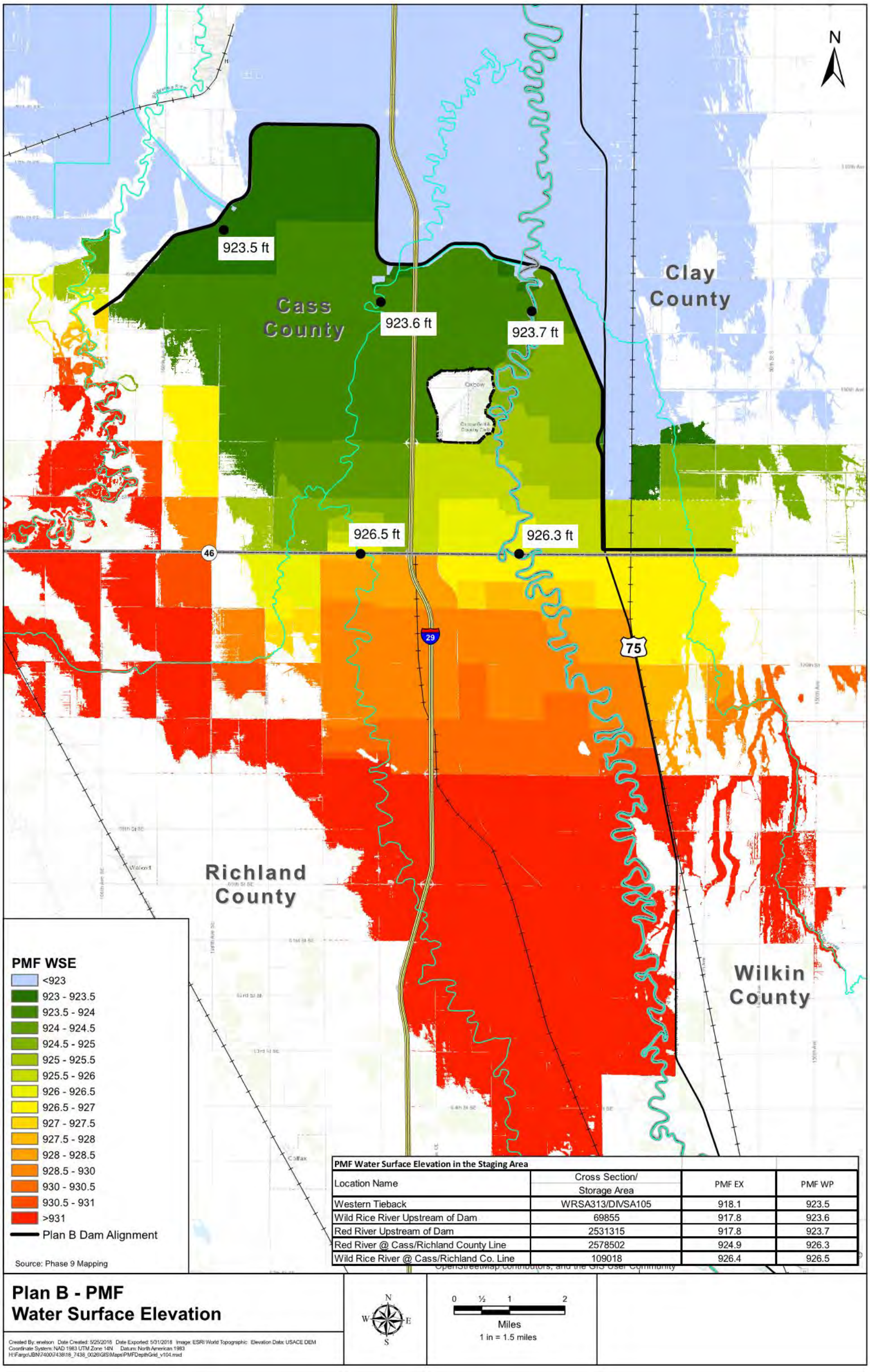

Figure 15. PMF Pool, Water Surface Elevations

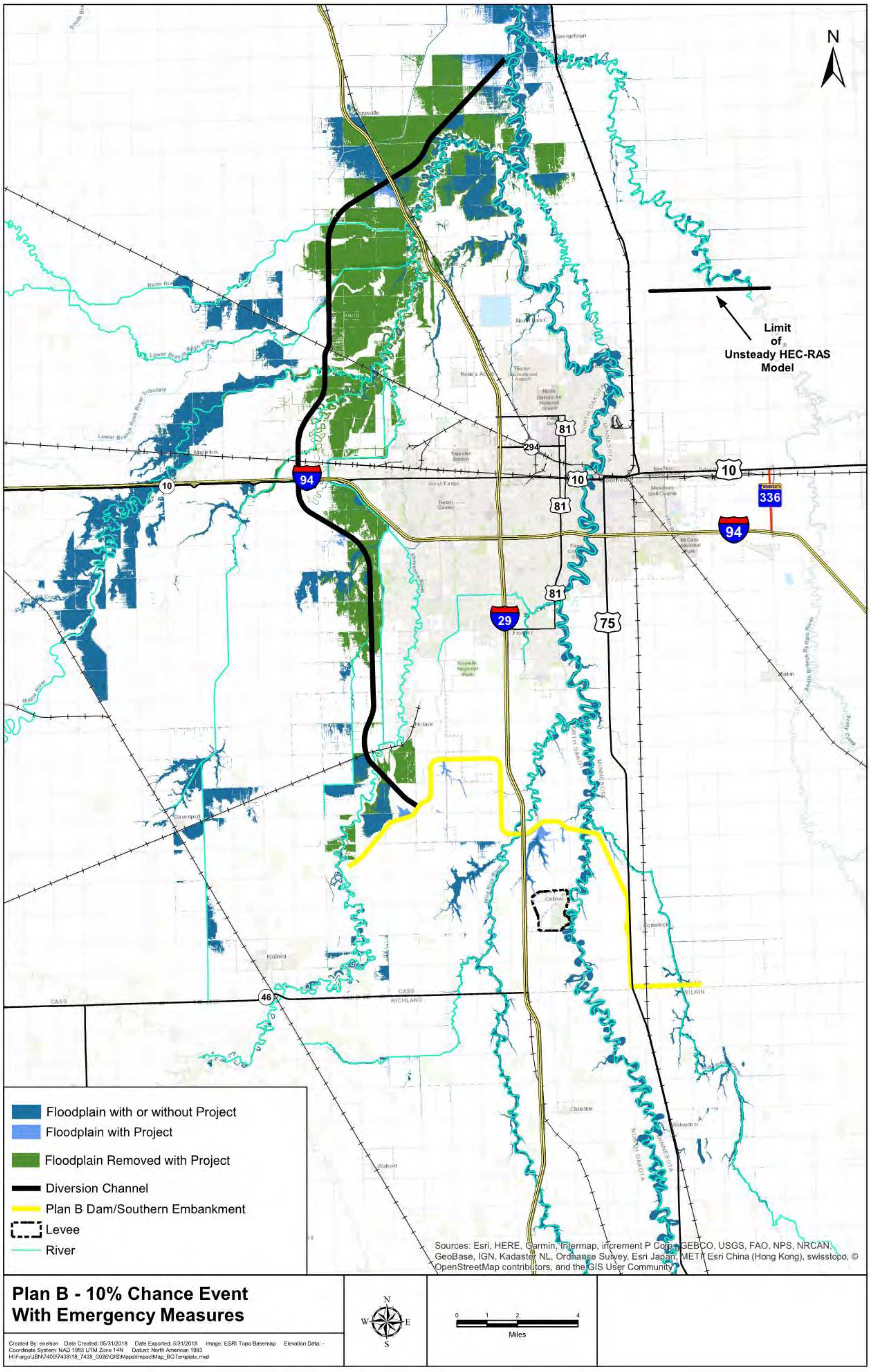

Figure 16: Floodplain, Existing and With Project Entire Metro Area, 10% ACE Event

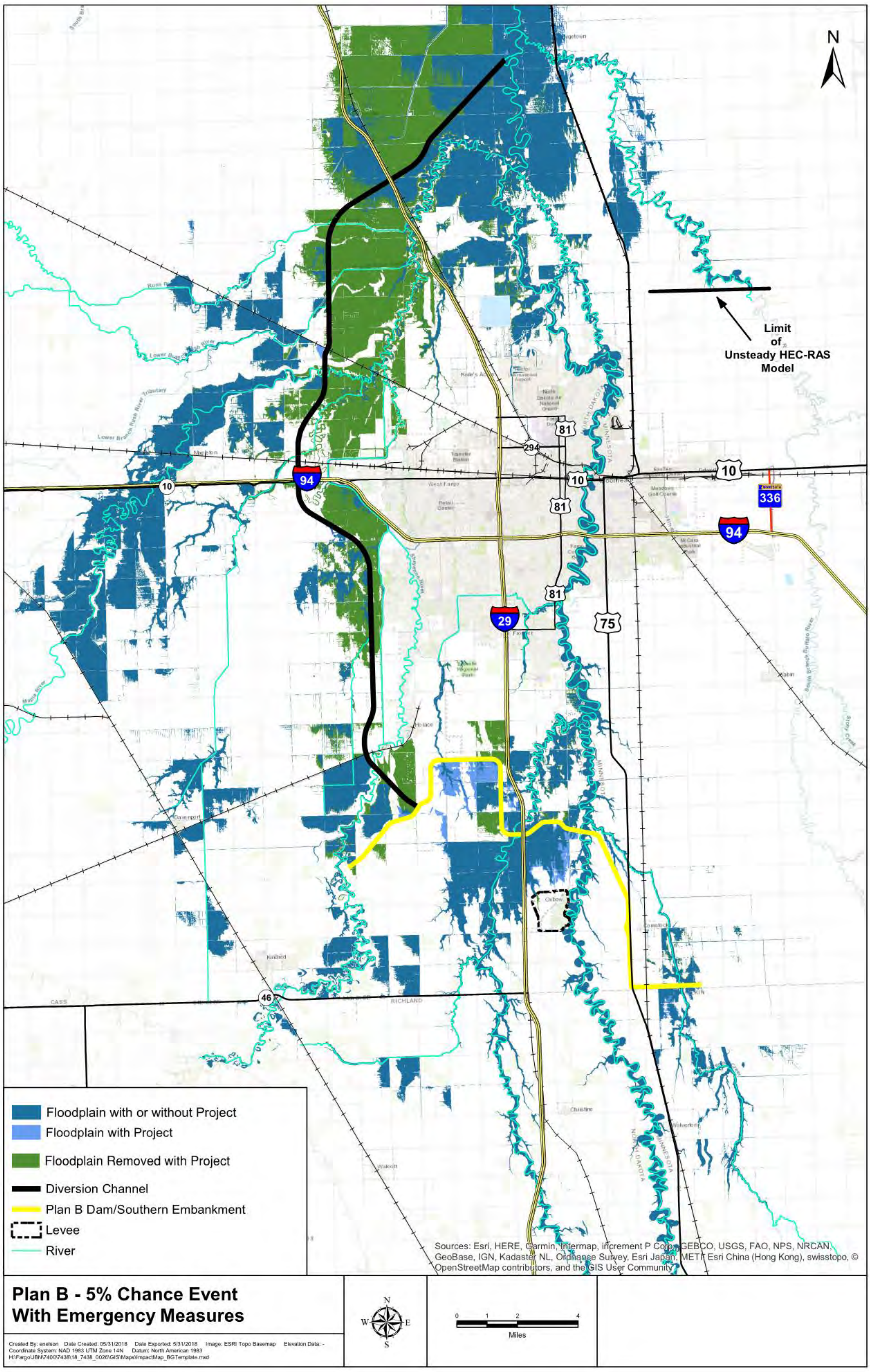

Figure 17: Floodplain, Existing and With Project Entire Metro Area, 5% ACE Event

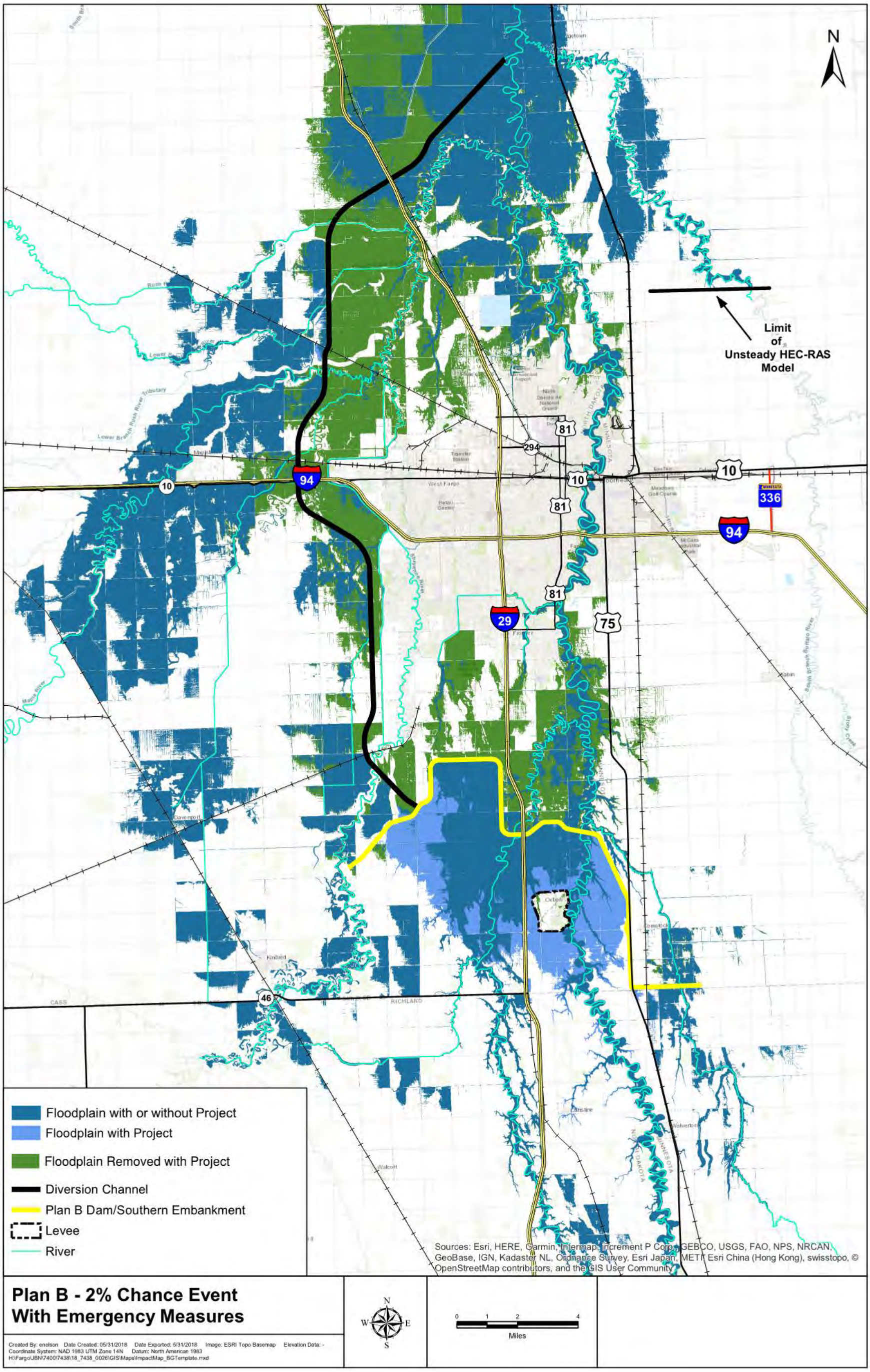

Figure 18: Floodplain, Existing and With Project Entire Metro Area, 2% ACE Event

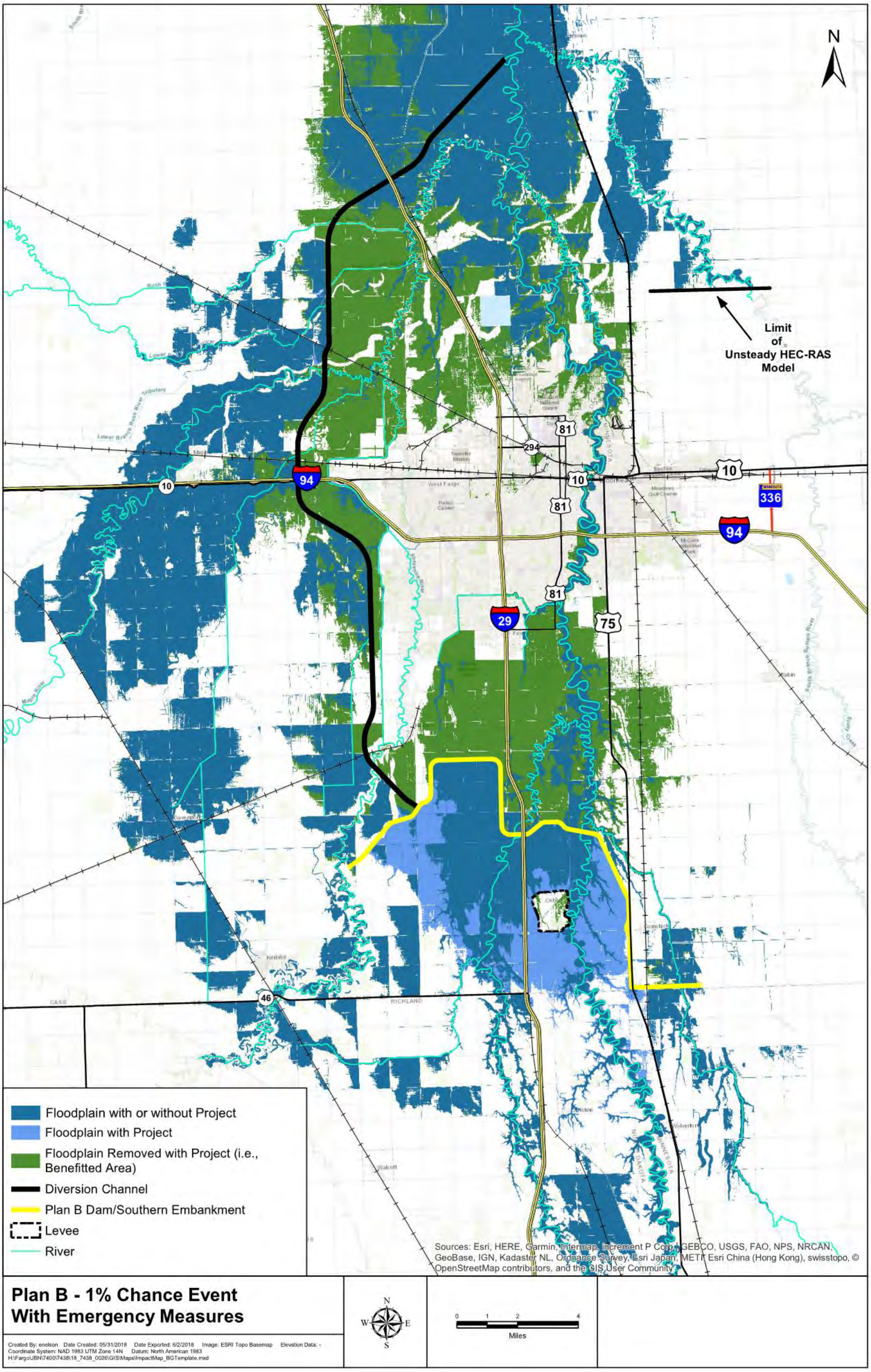

Figure 19: Floodplain, Existing and With Project Entire Metro Area, 1% ACE Event

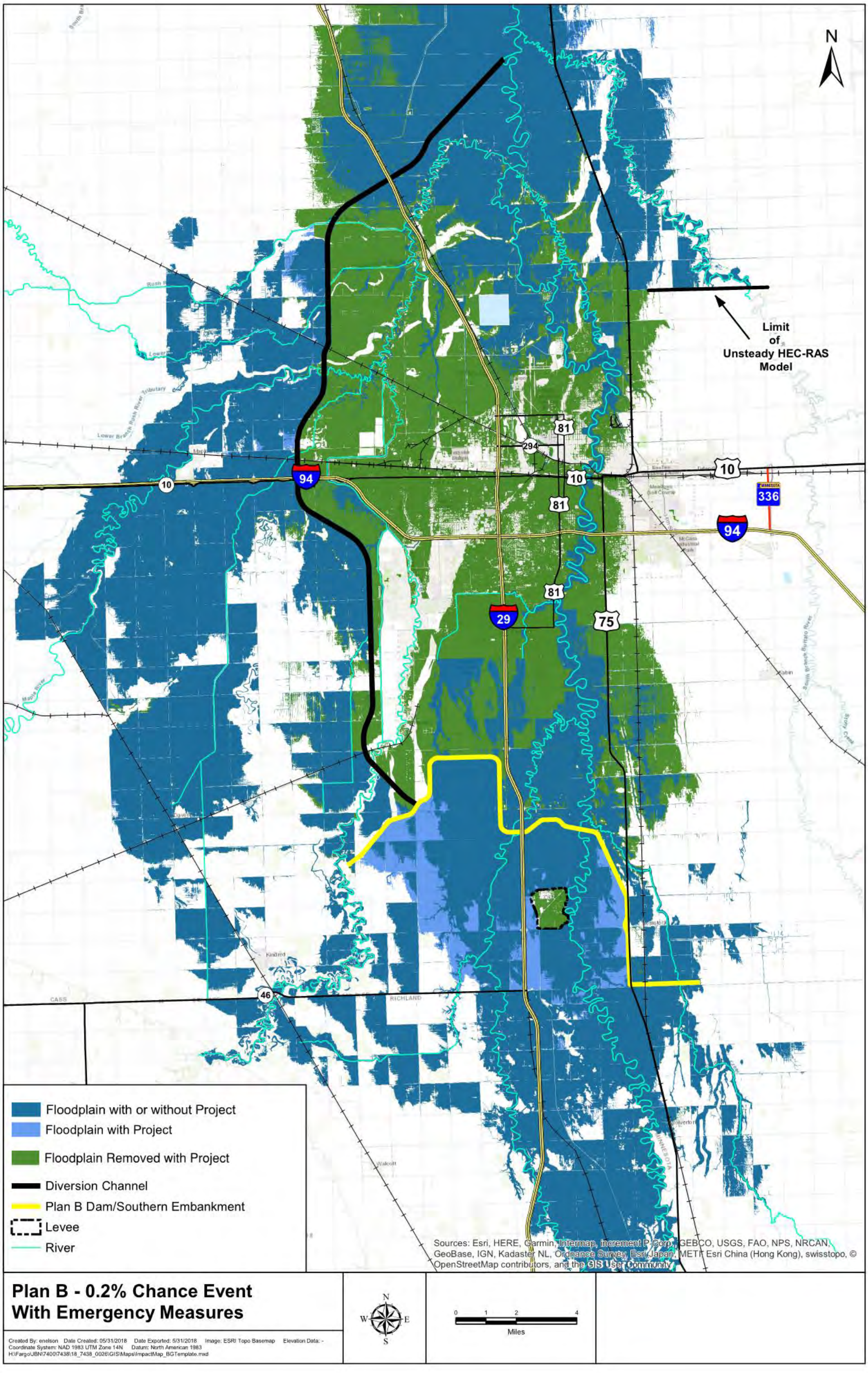

Figure 20: Floodplain, Existing and With Project Entire Metro Area, 0.2% ACE Event

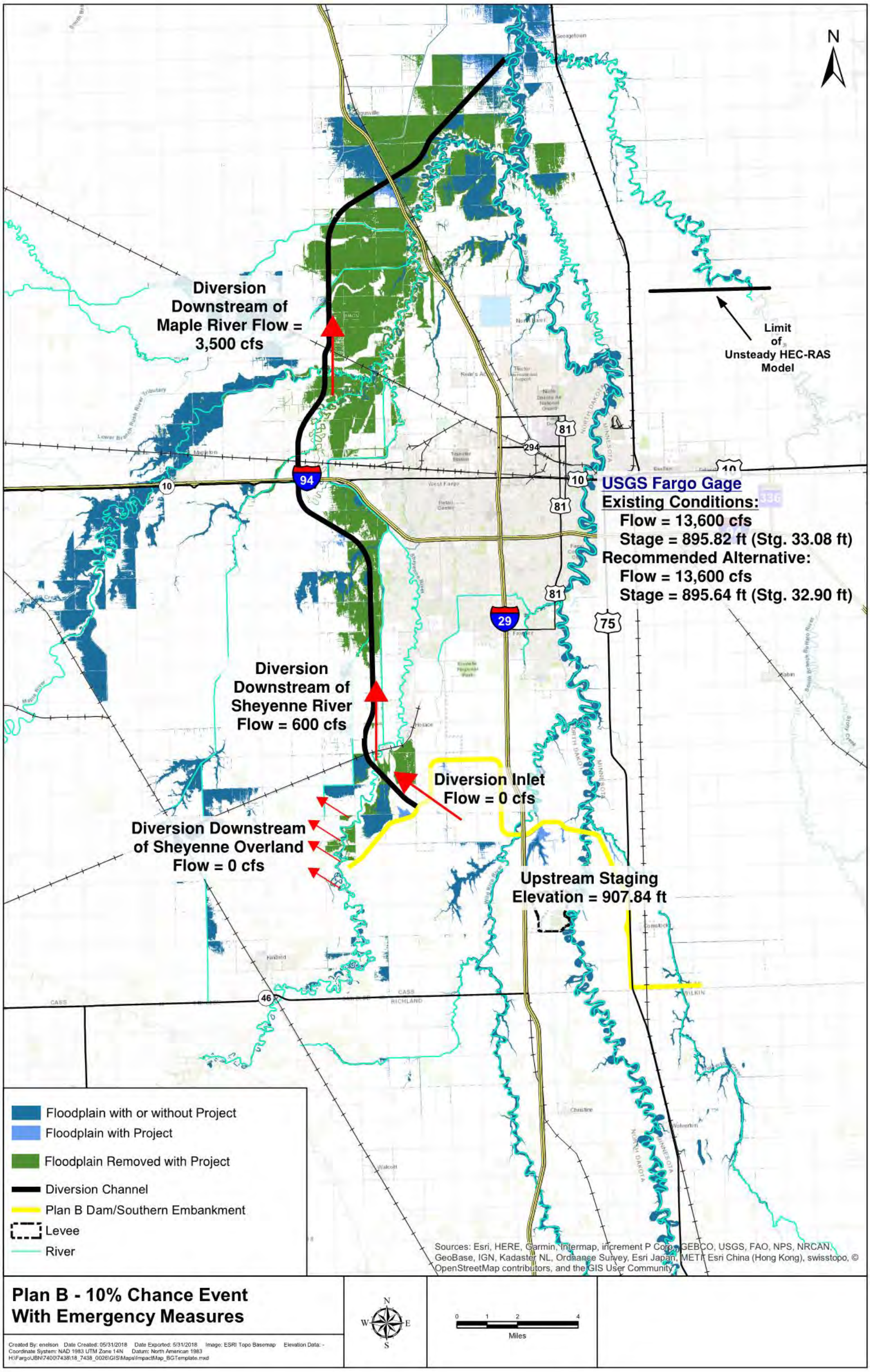

Figure 21: Floodplain/Flow, Existing and With Project Entire Metro Area, 10% ACE Event

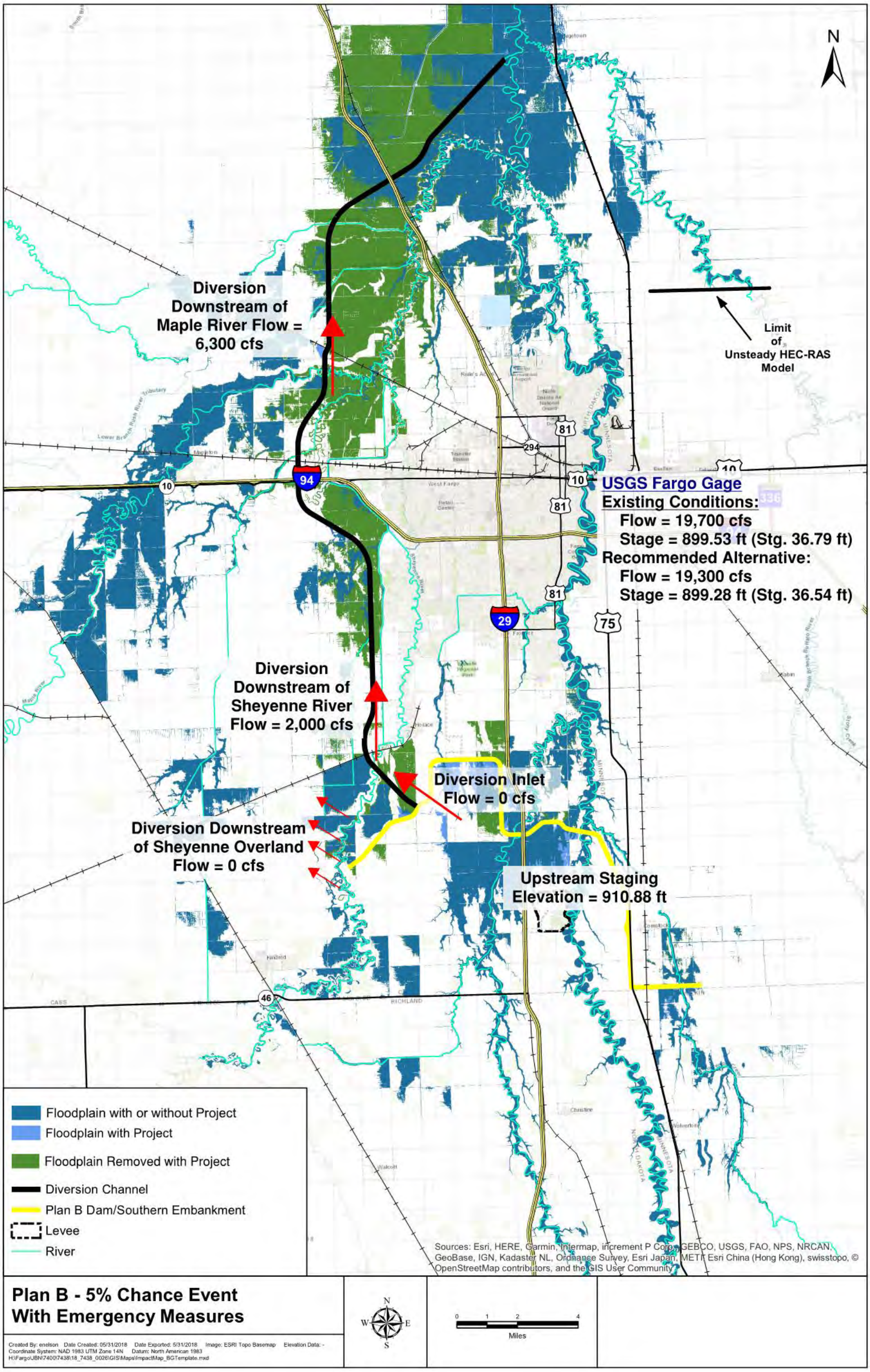

Figure 22: Floodplain/Flow, Existing and With Project Entire Metro Area, 5% ACE Event

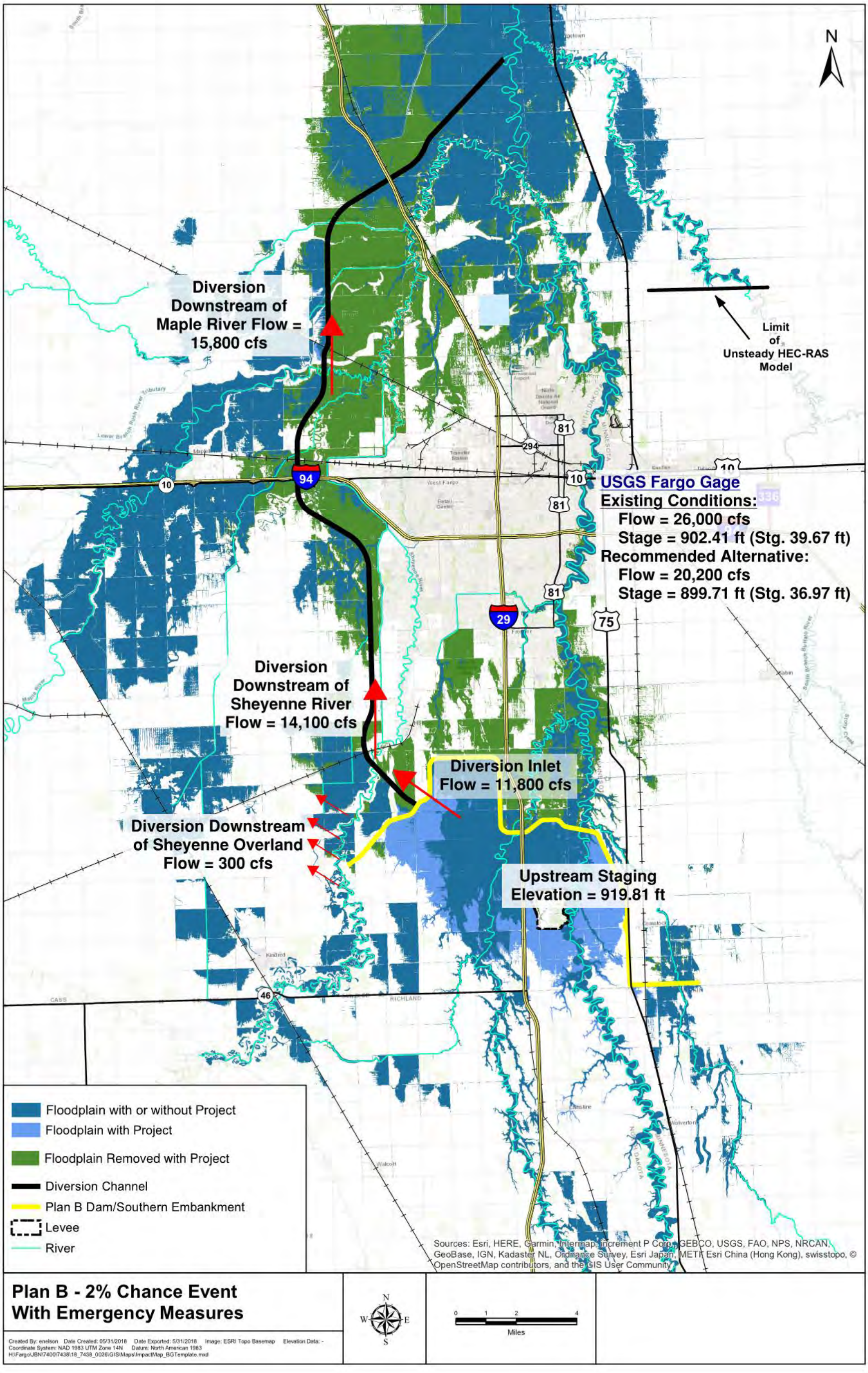

Figure 23: Floodplain/Flow, Existing and With Project Entire Metro Area, 2% ACE Event

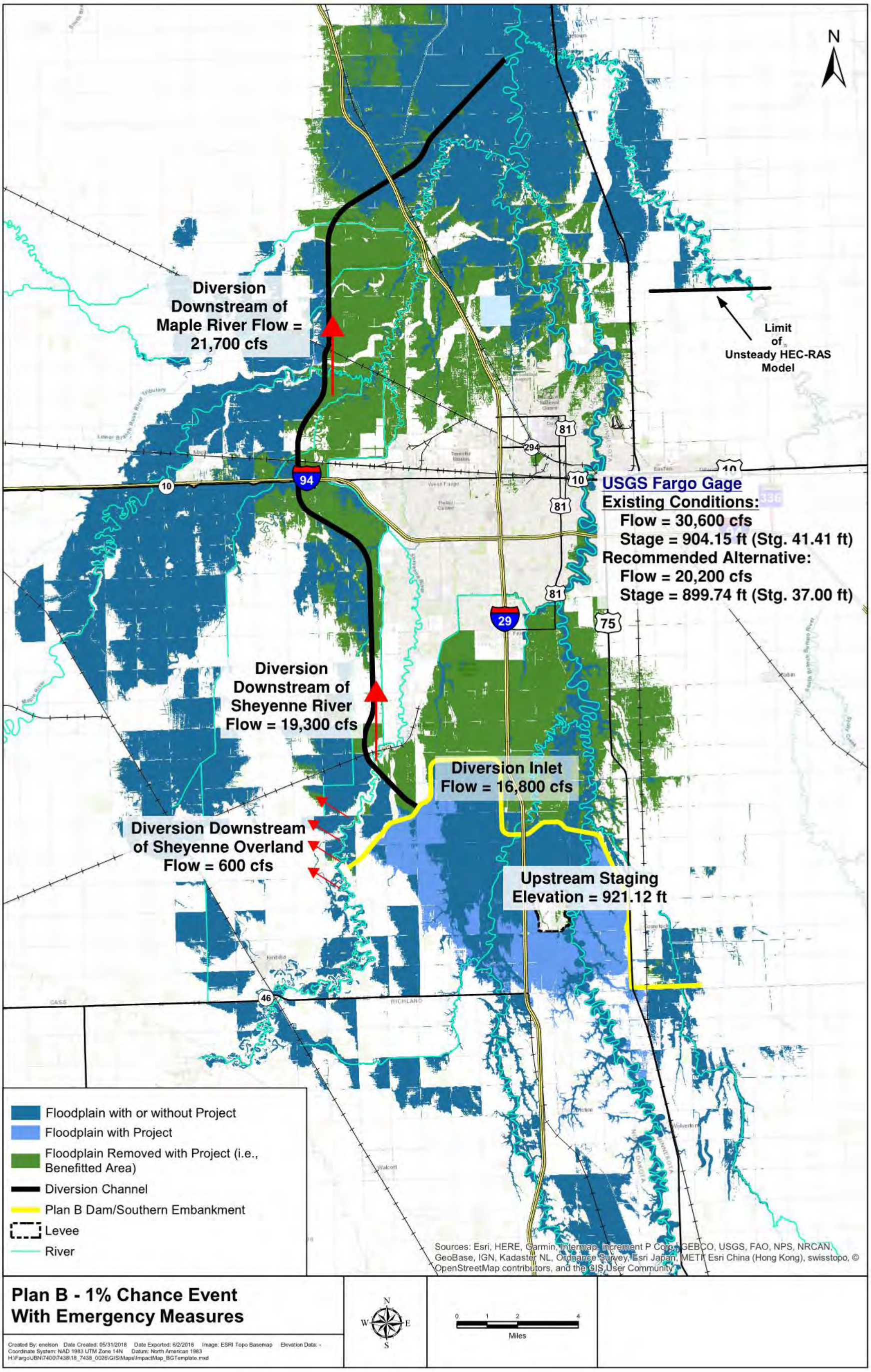

Figure 24: Floodplain/Flow, Existing and With Project Entire Metro Area, 1% ACE Event

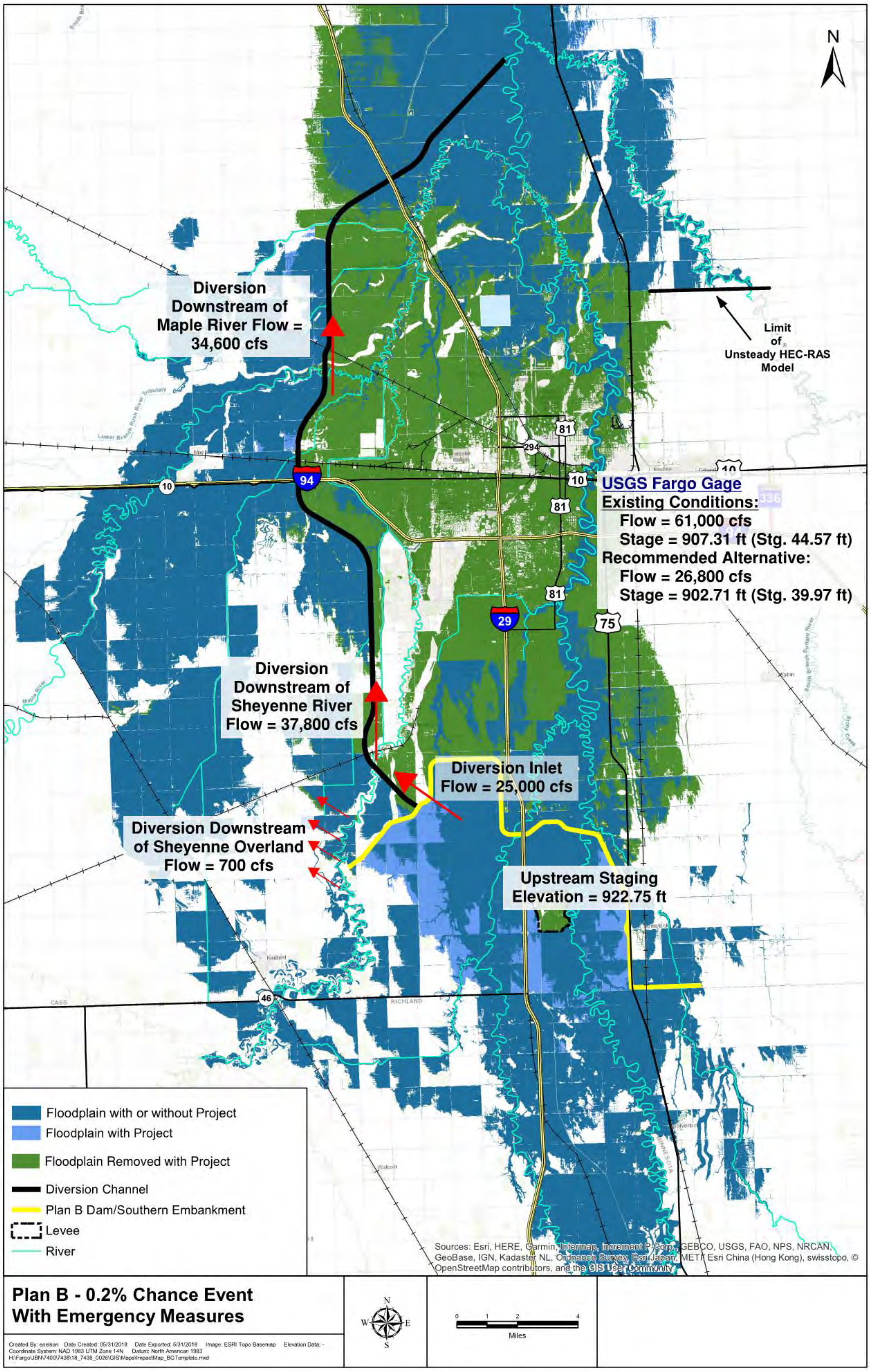

Figure 25: Floodplain/Flow, Existing and With Project Entire Metro Area, 0.2% ACE Event

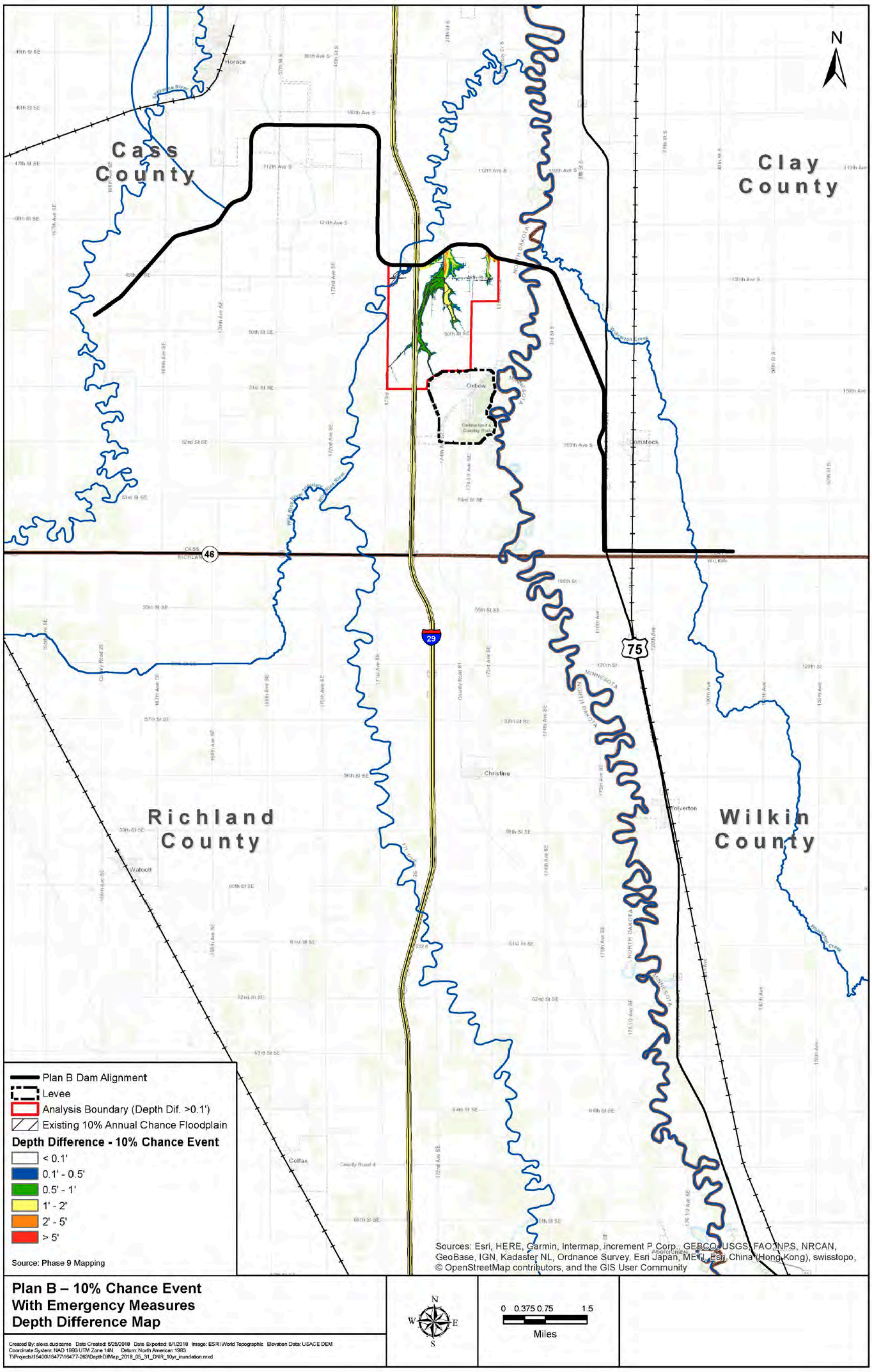

Figure 26: Depth Difference Pool, 10% ACE Event

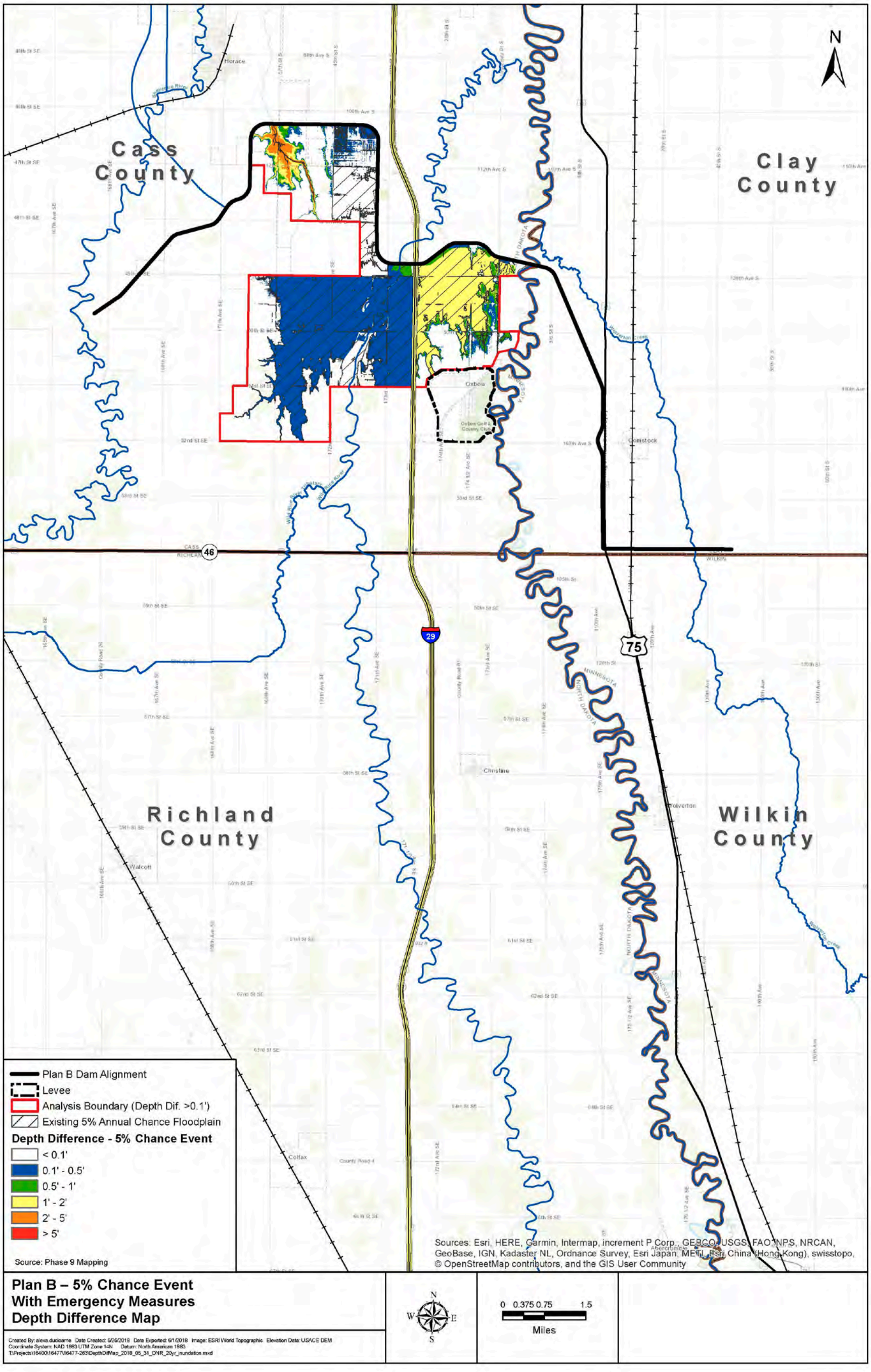

Figure 27: Depth Difference Pool, 5% ACE Event

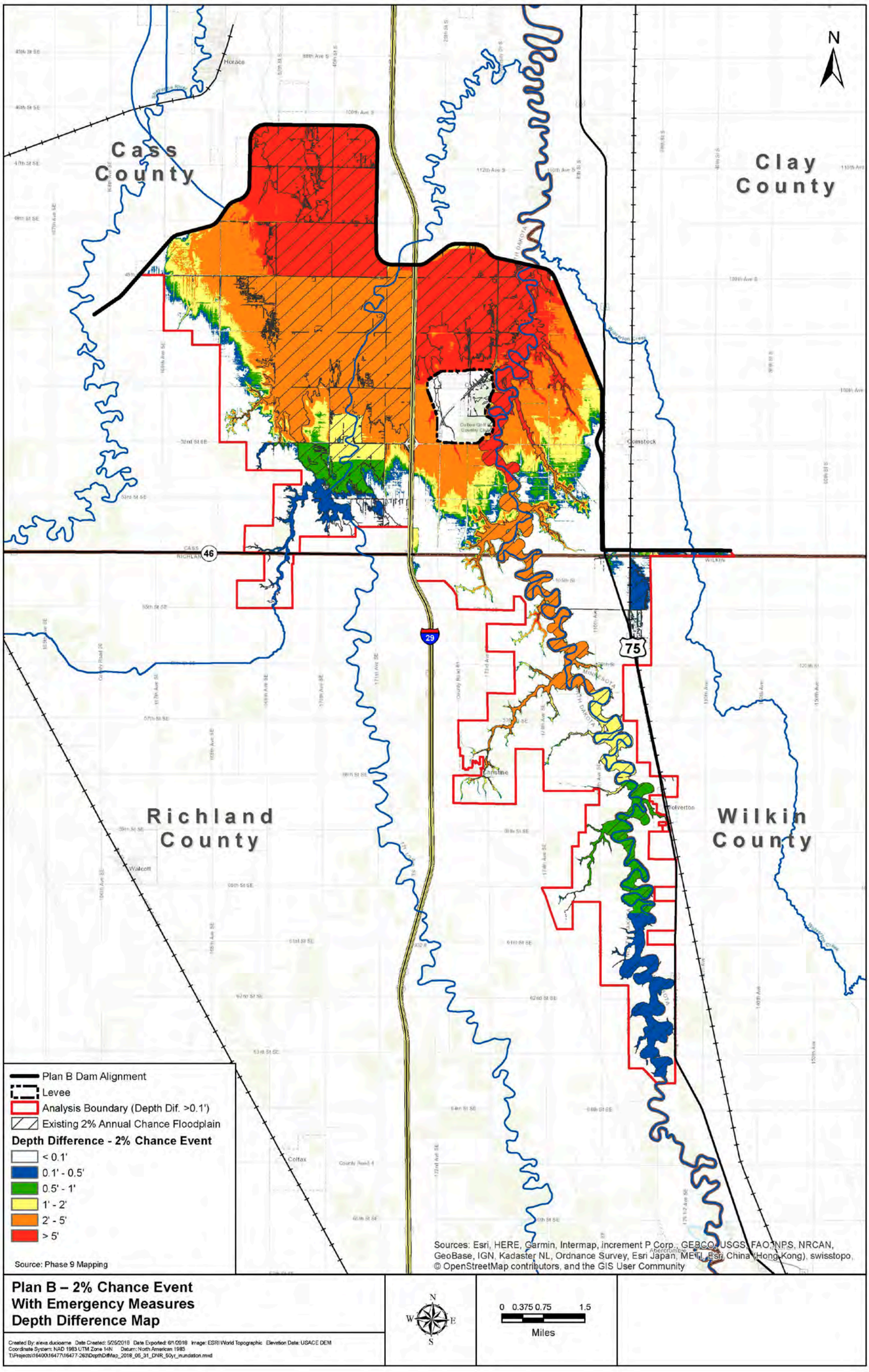

Figure 28: Depth Difference Pool, 2% ACE Event

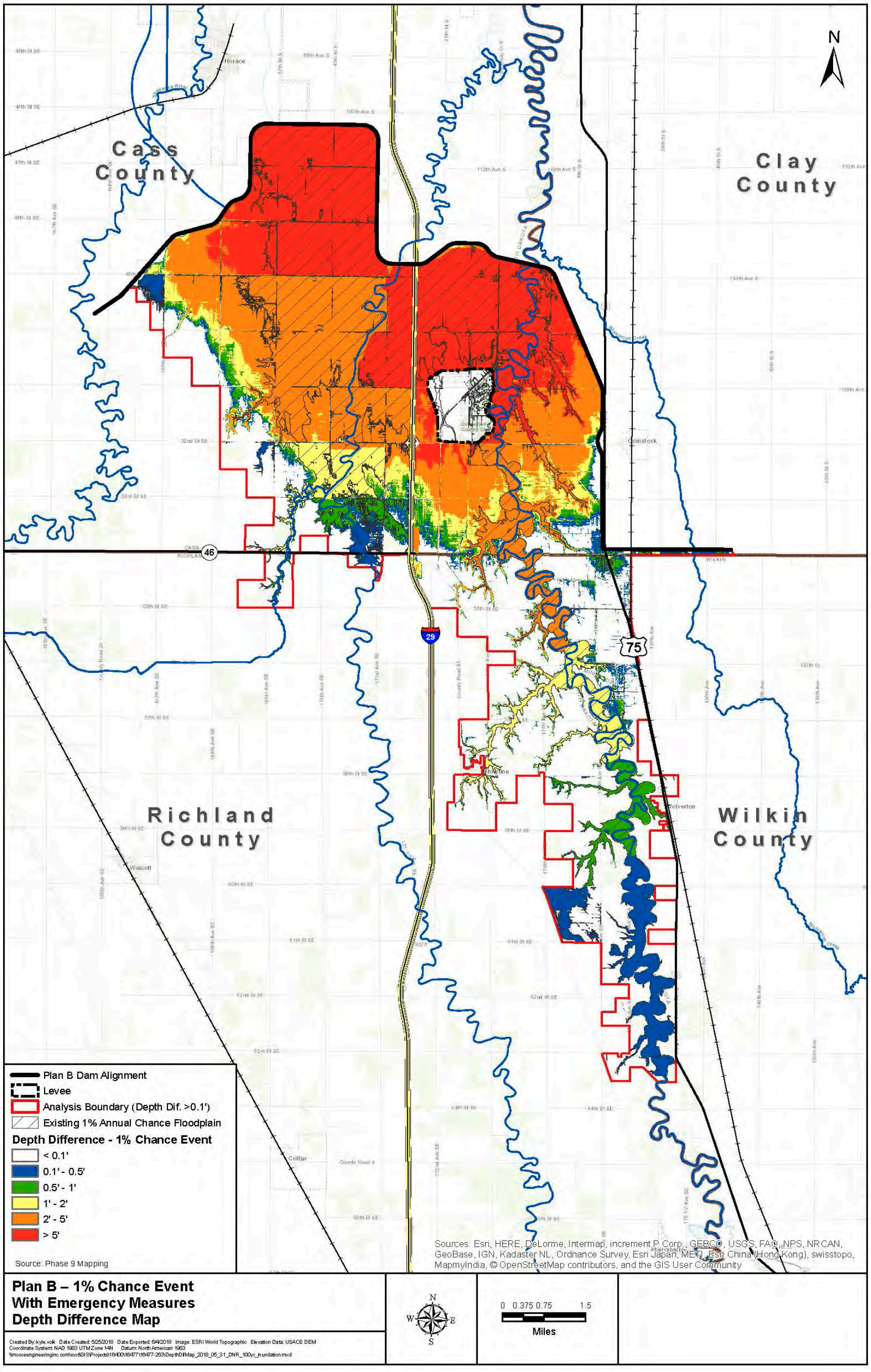

Figure 29: Depth Difference Pool, 1% ACE Event

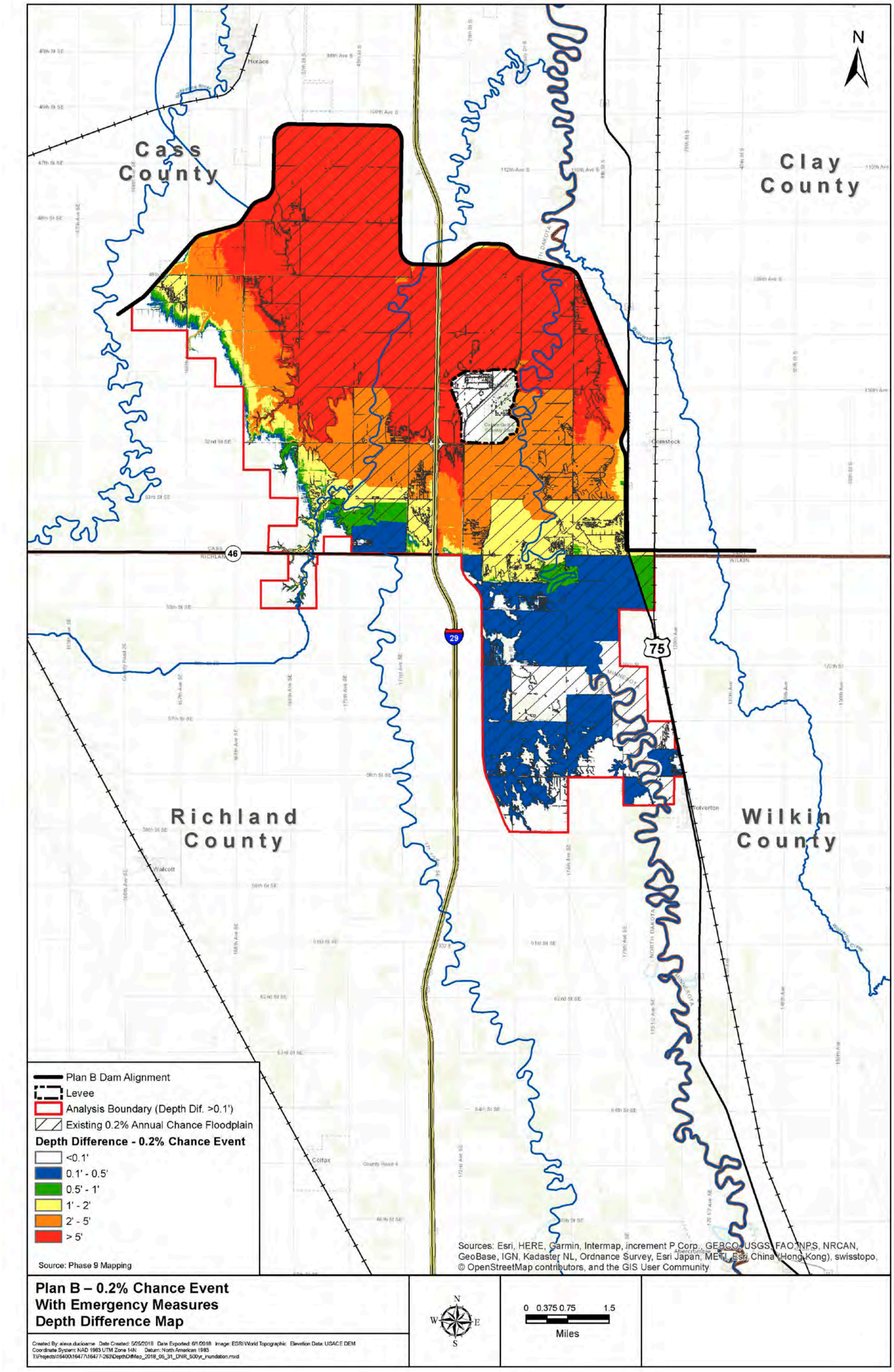

Figure 30: Depth Difference Pool, 0.2% ACE Event

Attachment 1

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Attachment 1 – POR Hydrology Development

To: Supplemental Environmental Assessment Document

From: Greg Thompson, PE, CFM; Jun Yang, PhD, PE

Subject: Appendix D Hydrology and Hydraulics – Attachment 1 POR Hydrology Development

Date: May 31, 2018

Project: Fargo-Moorhead Metropolitan Area Flood Risk Management Project EA Document

1. INTRODUCTION

This Technical Memorandum (TM) was written to document the development of the Period of Record (POR) Hydrology for Plan B of the Fargo-Moorhead Metropolitan Area Flood Risk Management Project (Project).

Inflow hydrology for the Project was originally developed by the US Army Corps of Engineers (USACE) during the Fargo-Moorhead Metro Flood Risk Management Project, Feasibility Study and Environmental Impact Statement, Phase 4, 2011 (FEIS). Within that study, the peak discharge and volume-duration hydrology had been developed over a period of approximately two years as new information became available and as the project changed. Initially, POR hydrology was developed for modeling within the immediate Fargo/Moorhead Metro area, but, as documented in a series of FEIS appendices, the hydrology was revised to focus on a shorter period of record developed by an Expert Opinion Elicitation (EOE) panel. The EOE hydrology produced peak flow and balanced hydrographs that varied over time. Project design focused on assuring the project would perform for the highest peak flow and volume conditions identified via the EOE panel. This hydrology has since been referred to as the Wet Cycle Hydrology, and in this TM, it will be referred to as EOE/WET. Shortly after the EOE/WET hydrology was developed, the model was extended downstream to the Canadian Border to adequately simulate downstream impacts. Then, to offset downstream impacts, the Southern Embankment (Dam) and Upstream Staging Area were incorporated into the project, which required the modeling and subsequent inflow hydrology to be extended further upstream. Each project change resulted in a change to the hydrology. The most recent change occurred in 2017/2018 during development of Plan B where the Governors' Task Force decided that the project should use the POR hydrology instead of the EOE/WET hydrology.

Since EOE hydrology had been chosen as the path forward, the POR hydrology developed by USACE during the FEIS was not completed to support the current modeling efforts. Therefore, as documented in this TM, additional hydrology was created by Houston-Moore Group (HMG) for Plan B within a modeling effort referred to as Phase 9. The tables in this TM describe a progression of how the EOE/WET and POR hydrology components were created during and after the FEIS, and how the POR hydrology was created for Phase 9. Modeling for Phase 9 included 10-, 5-, 2-, 1-, and 0.2-percent Annual Chance Events (ACE), also commonly referred to as 10-year, 20-year, 50-year, 100-year, and 500-year flood events, respectively. The 4-percent chance event (25-year) was also included in Phase 9 because it is commonly used in flood insurance study evaluations, and the 0.5-percent chance event (200-year) was included in the Phase 9 analysis because it provides an intermediate reference point between the 100-year and 500-year events.

2. BACKGROUND/HYDROLOGY TERMINOLOGY

Peak Discharges - Annual instantaneous peak discharges were created for each streamflow gage along the Red River including gages at Enloe ND, Hickson ND, Fargo ND, Halstad MN, Thompson ND, Grand Forks ND, Oslo MN, and Drayton ND. The initial peak discharges were created by USACE, and the Plan B POR discharges were developed by HMG as described below.

Balanced Hydrographs – Volume-Duration-Frequency analyses were conducted by USACE for the EOE/WET hydrology at the gage locations along the Red River. For the Plan B modeling effort, HMG developed hydrographs that closely resemble the USACE derived balanced hydrographs using known information from the previous USACE EOE/WET hydrology analysis.

3. FEASIBILITY STUDY/ENVIRONMENTAL IMPACT STATEMENT HYDROLOGY

a) Initial Inflow Hydrology – FEIS Appendix A-2

The discharges displayed in Table 1 originated from FEIS Appendix A-2, Table 24 (POR), and the discharges displayed in Table 2 originated from FEIS Appendix A-2, Table 25 (EOE/WET). At the time, only these locations were needed for model simulation because the focus of the modeling was near the Fargo/Moorhead Metro area. However, the remaining blank cells in Table 1 show the locations and flood events that are required for the Plan B analysis. This TM documents the development of the remaining POR discharges and modifications made to some of the discharges presented in Table 1. Notice that peak discharges for Enloe, Thompson, Oslo, and Drayton were not initially developed in the FEIS. Additionally, the 4-percent chance event discharges had not been developed.

Table 1: Red River Peak Discharges, POR Hydrology from FEIS, Appendix A-2, Table 24

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Drayton	-	-	-	-	-	-	-
Oslo	-	-	-	-	-	-	-
Grand Forks	50,500	67,300	-	91,700	112,000	134,000	165,000
Thompson	-	-	-	-	-	-	-
Halstad	29,800	39,900	-	54,600	66,900	80,200	99,200
Fargo	13,865	19,831	-	26,000	33,000	43,500	66,000
Hickson	8,400	12,000	-	19,000	23,100	28,300	35,000
Enloe	-	-	-	-	-	-	-

Table 2: Red River Peak Discharges, EOE/WET Hydrology from FEIS Appendix A-2, Table 25

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Drayton	-	-	-	-	-	-	-
Oslo	-	-	-	-	-	-	-
Grand Forks	56,354	70,956	-	91,026	106,838	123,201	145,675
Thompson	-	-	-	-	-	-	-
Halstad	34,871	45,014	-	59,306	70,798	82,872	99,713
Fargo	17,000	22,000	-	29,300	34,700	46,200	61,700
Hickson	10,500	14,800	-	21,000	25,000	28,500	32,000
Enloe	-	-	-	-	-	-	-

b) Inflow Hydrology – FEIS Appendix A-4b

The EOE/WET peak discharges displayed in Table 3 originated from FEIS Appendix A-4b, Table 24. This hydrology effort included developing additional EOE/WET hydrology peak discharges for streamflow gages at downstream locations, such as Oslo, MN and Drayton, ND. At this point in time the project was to focus on EOE/WET hydrology, therefore no POR discharges were recorded for the new locations. Also, the peak discharges for Hickson were revised from what was presented in Appendix A-2. Enloe was not considered at this point in time because the staging area was not a project component and the model did not need to be extended upstream to Enloe.

Table 3: Red River EOE/WET Peak Discharges - Inflow Hydrology - FEIS Appendix A-4b, Table 24

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Drayton	**62,847**	**79,061**	-	**101,292**	**118,757**	**136,789**	**161,486**
Oslo	**58,970**	**74,459**	-	**95,773**	**112,569**	**129,950**	**153,811**
Grand Forks	56,354	70,956	-	91,026	106,838	123,201	145,675
Thompson	42,899	55,519	-	72,898	86,765	101,001	121,080
Halstad	34,871	45,014	-	59,306	70,798	82,872	99,713
Fargo	17,000	22,000	-	29,300	34,700	46,200	61,700
Hickson	**10,500**	**14,000**	-	**19,000**	**22,000**	**28,500**	**37,000**
Enloe	-	-	-	-	-	-	-

c) Hickson Gage Inflow Hydrology Revision – USACE Report, January 2015

EOE/WET peak discharges for the Hickson Gage were revised in January 2015 to better reflect breakout characteristics from the Wild Rice River to the Red River near Abercrombie, North Dakota. As displayed in Table 4**Error! Reference source not found.**, revisions from this analysis were made to the EOE/WET hydrology, as documented in "The Use of Synthetic Floods for Defining the Regulated Flow-Frequency & Volume Duration Frequency Curves for the Red River at Hickson, North Dakota" (January 2015), Table 12.

Following the January 2015 report, USACE also provided peak discharges for the Enloe Gage for the WET hydrology, which is approximately 30 river miles upstream of the Hickson Gage. The Enloe Gage data was provided for use as the inflow at the upstream end of the Red River, which was needed after incorporating the Dam and Upstream Staging Area. Note that Enloe hydrology was not provided for the 4- or 5-percent chance events because they were not in the scope of the analysis at that point in time.

Table 4: Hydrology Updates – EOE/WET Hydrology, Hickson and Enloe – USACE, January 2015

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Drayton	62,847	79,061	-	101,292	118,757	136,789	161,486
Oslo	58,970	74,459	-	95,773	112,569	129,950	153,811
Grand Forks	56,354	70,956	-	91,026	106,838	123,201	145,675
Thompson	42,899	55,519	-	72,898	86,765	101,001	121,080
Halstad	34,871	45,014	-	59,306	70,798	82,872	99,713
Fargo	17,000	22,000	-	29,300	34,700	46,200	61,700
Hickson	**9,600**	**13,200**	-	**19,000**	**23,500**	**28,500**	**36,000**
Enloe	**10,031**	-	-	**20,053**	**24,164**	**29,512**	**35,303**

d) 4-Percent Chance Event Peak Discharges – USACE, May 2015

In May 2015, peak discharges for the 4-percent chance event were provided for gages at Hickson, Fargo, and Halstad. Table 5 presents the additional EOE/WET peak discharges.

Table 5: EOE/WET Hydrology, 4-Percent Chance Event Discharge Updates - USACE, May 2015

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Drayton	62,847	79,061	-	101,292	118,757	136,789	161,486
Oslo	58,970	74,459	-	95,773	112,569	129,950	153,811
Grand Forks	56,354	70,956	-	91,026	106,838	123,201	145,675
Thompson	42,899	55,519	-	72,898	86,765	101,001	121,080
Halstad	34,871	45,014	**48,348**	59,306	70,798	82,872	99,713
Fargo	17,000	22,000	**23,900**	29,300	34,700	46,200	61,700
Hickson	9,600	13,200	**14,450**	19,000	23,500	28,500	36,000
Enloe	10,031	-	-	20,053	24,164	29,512	35,303

e) Fargo Gage Hydrograph Volume Revisions – USACE, July 2015

Prior to July 2015, the shapes of the balanced hydrographs were relatively narrow compared to observed historical hydrographs of similar magnitude. In 2013, the Red River Basin Commission (RRBC) conducted a basin-wide hydrology modeling effort where a HEC-HMS hydrology model was developed for each watershed upstream of the Red River Gage at Halstad, MN. Hydrographs from this modeling effort were compared to the balanced hydrographs developed for the project. Hydrographs from the RRBC modeling effort were similar in

shape to historical events, but displayed more volume than the balanced hydrographs at the time. Therefore, the balanced hydrograph procedure was reevaluated, and modifications were made to the Hickson and Fargo Gage balanced hydrographs. Revisions reflected in this effort only changed the volume-duration relationships, not the peak discharges. Due to the scope of the project at this point in time, higher volume hydrographs were only created for the 10-, 2-, 1-, 0.5-, and 0.2-percent chance events using EOE/WET hydrology.

4. PLAN B – PERIOD OF RECORD HYDROLOGY

This section documents the POR hydrology development to be used with Plan B. As presented in Table 1, POR hydrology was previously developed for Hickson, Fargo, Halstad, and Grand Forks. However, due to several changes following the FEIS, and an incomplete POR data set, HMG was tasked with developing the POR hydrology using relationships from available POR records as well as previously developed EOE/WET hydrology.

a) Hickson and Enloe POR Peak Discharges and Hydrographs

Annual instantaneous peak discharges for Hickson were first presented in the FEIS Appendix A-2, using both EOE/WET and POR hydrology. Now, since POR hydrology is required for Plan B, and the EOE discharges have been revised since the FEIS, the old POR/EOE relationship from the FEIS will be used to create updated POR hydrology for Hickson. As presented in Table 6, a unique ratio for each design event has been established to apply to the updated EOE/WET discharges from Table 5 for producing updated POR discharges as shown in Table 7 for Hickson and Table 8 for Enloe. After evaluating peak discharge and volume proportions between Enloe, Abercrombie, and Fargo, and after reviewing the discharge-frequency curves for Hickson and Enloe, the peak discharges will be further refined, with final numbers presented in Table 20.

Table 6: Discharge Relationship between EOE/WET and POR Hydrology at Hickson, ND (Source: FEIS, January 2011)

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Hickson EOE/WET	10,500	14,800	15,700	21,000	25,000	28,500	32,000
Hickson POR	8,400	12,000	13,000	19,000	23,100	28,300	35,000
Ratio POR to EOE/WET	0.80	0.81	0.83	0.90	0.92	0.99	1.09

Table 7: New POR Discharges for Hickson Gage (Not Final)

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Hickson EOE/WET (Table 5)	9,600	13,200	14,450	19,000	23,500	28,500	36,000
Ratio, POR to EOE/WET (Table 6)	0.80	0.81	0.83	0.90	0.92	0.99	1.09
Hickson POR (2018)	**7,700**	**10,700**	**12,000**	**17,200**	**21,700**	**28,300**	**39,400**

Table 8: New POR Discharges for Enloe Gage (Not Final)

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Enloe EOE/WET (Table 5)	10,031	-	-	20,053	24,164	29,512	35,303
Ratio, POR to EOE/WET (Table 6)	0.80	0.81	0.83	0.90	0.92	0.99	1.09
Enloe POR (2018)	**8,000**	-	-	**18,100**	**22,300**	**29,300**	**38,600**

b) Peak Discharges for 4-Percent and 5-Percent Chance Events

Reservoirs in the upper portions of the Red River Basin and breakout flows between upstream watersheds produce complex discharge-frequency relationships upstream of Fargo. Because of this, it is understood that standard Log-Pearson Type III plotting procedures should not be used at Enloe, Hickson, or Fargo, but it can be used for locations downstream of Fargo because of the extended distance downstream of reservoirs. While recognizing this, yet also observing smooth relationships on such plots, 4-percent chance (25-year) and 5-percent chance (20-year) event peak discharges were created from larger and smaller events. Exhibits 1 through 8 display Log-Pearson Type III plots for the POR and EOE/WET hydrology at each of the streamflow gages along the Red River. From these plots, the peak discharges have been estimated for the 4-percent and 5-percent chance events for the EOE/WET hydrology (Table 9) and POR hydrology (Table 10).

Table 9: EOE/WET 0.4-Percent Chance Event Peak Discharge Development Using Discharge-Frequency Relationships

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Drayton	62,847	79,061	**84,500**	101,292	118,757	136,789	161,486
Oslo	58,970	74,459	**79,500**	95,773	112,569	129,950	153,811
Grand Forks	56,354	70,956	**75,000**	91,026	106,838	123,201	145,675
Thompson	42,899	55,519	**59,400**	72,898	86,765	101,001	121,080
Halstad	34,871	45,014	48,348	59,306	70,798	82,872	99,713
Fargo	17,000	22,000	23,900	29,300	34,700	46,200	61,700
Hickson	9,600	13,200	14,450	19,000	23,500	28,500	36,000
Enloe	10,031	14,500	**15,500**	20,053	24,164	29,512	35,303

Table 10: POR 0.4-Percent Chance Event Peak Discharge Development Using Discharge-Frequency Relationships

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Drayton							
Oslo							
Grand Forks	50,500	67,300	**72,000**	91,700	112,000	134,000	165,000
Thompson							
Halstad	29,800	39,900	**43,200**	54,600	66,900	80,200	99,200
Fargo	13,865	19,831	**21,400**	26,000	33,000	43,500	66,000
Hickson	7,700	10,700	**12,000**	17,200	21,700	28,300	39,400
Enloe	8,000	**11,800**	**13,000**	18,100	22,300	29,300	38,600

c) POR Hydrology Peak Discharge Development for Thompson, Oslo, and Drayton

As previously described, EOE/WET peak discharges are available at all reporting locations. From FEIS Appendix A-2, a POR to EOE/WET ratio was created for Grand Forks to be used in generating POR hydrology for Oslo and Drayton. This is shown in Table 11. Using the Grand Forks ratios, the POR peak discharges that were created for Oslo and Drayton are shown in Table 12 and Table 13, respectively.

Table 11: POR to EOE/WET Annual Instantaneous Peak Discharge Ratios for Grand Forks, North Dakota

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Grand Forks POR	50,500	67,300	72,000	91,700	112,000	134,000	165,000
Grand Forks EOE/WET	56,354	70,956	75,000	91,026	106,838	123,201	145,675
Ratio POR to EOE/WET	**0.90**	**0.95**	**0.96**	**1.01**	**1.05**	**1.09**	**1.13**

Table 12: Oslo, Minnesota POR Peak Discharges Created from Grand Forks POR to EOE/WET Ratios

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Oslo EOE/WET	58,970	74,459	79,500	95,773	112,569	129,950	153,811
Ratio POR to EOE/WET	0.90	0.95	0.96	1.01	1.05	1.09	1.13
Oslo POR	**52,800**	**70,600**	**76,300**	**96,500**	**118,000**	**141,300**	**174,200**

Table 13: Drayton, North Dakota POR Peak Discharges Created from Grand Forks POR to EOE/WET Ratios

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Drayton EOE/WET	62,847	79,061	84,500	101,292	118,757	136,789	161,486
Ratio POR to EOE/WET	0.90	0.95	0.96	1.01	1.05	1.09	1.13
Drayton POR	**56,300**	**75,000**	**81,100**	**102,000**	**124,500**	**148,800**	**182,900**

The POR peak discharges for Thompson, North Dakota were created in a similar manner as the discharges for Oslo and Drayton, except for the ratios for Thompson were created using an average ratio from Fargo, Halstad, and Grand Forks. The Halstad POR to EOE/WET ratios are presented in Table 14, and the Fargo POR to EOE/WET ratios are presented in Table 15. Combining the ratios from Grand Forks, Halstad, and Fargo, Table 16 presents the average POR to EOE/WET ratio to be used for developing the Thompson discharges. Table 17 presents the POR discharges for Thompson, North Dakota.

Table 14: POR to EOE/WET Annual Instantaneous Peak Discharge Ratios for Halstad, Minnesota

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Halstad POR	29,800	39,900	43,200	54,600	66,900	80,200	99,200
Halstad EOE/WET	34,871	45,014	48,348	59,306	70,798	82,872	99,713
Ratio POR to EOE/WET	**0.85**	**0.89**	**0.89**	**0.92**	**0.94**	**0.97**	**0.99**

Table 15: POR to EOE/WET Peak Discharge Ratios for Fargo, North Dakota

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Fargo POR	13,865	19,831	21,400	26,000	33,000	43,500	66,000
Fargo EOE/WET	17,000	22,000	23,900	29,300	34,700	46,200	61,700
Ratio POR to EOE/WET	**0.82**	**0.90**	**0.90**	**0.89**	**0.95**	**0.94**	**1.07**

Table 16: Average POR to EOE/WET Ratios Used to Develop POR Peak Discharges for Thompson, North Dakota

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Grand Forks Ratio	0.90	0.95	0.96	1.01	1.05	1.09	1.13
Halstad Ratio	0.85	0.89	0.89	0.92	0.94	0.97	0.99
Fargo Ratio	0.82	0.90	0.90	0.89	0.95	0.94	1.07
Average Ratio	**0.86**	**0.91**	**0.92**	**0.94**	**0.98**	**1.00**	**1.07**

Table 17: Thompson, North Dakota Peak Discharges Using Average POR to EOE/WET Ratios from Grand Forks, Halstad, Fargo.

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Thompson EOE/WET	42,899	55,519	59,400	72,898	86,765	101,001	121,080
Ratio POR to EOE/WET	0.86	0.91	0.92	0.94	0.98	1.00	1.07
Thompson POR	**36,700**	**50,600**	**54,400**	**68,400**	**85,200**	**100,900**	**129,000**

d) Modifications Made to Enloe/Hickson Discharges

At the upstream end of the project, the Enloe and Hickson Gages are relatively close in proximity to each other. Also, there are no significant tributary inflows between the gages, so the calculated peak inflows are very similar at the two gages. The January 2015 USACE Report documented a reduction in the Hickson EOE/WET discharges from 10,500 cfs to 9,600 cfs. Therefore, it was assumed that a similar reduction should apply to the POR development as well. However, after reviewing general trends in the proportion of water originating from the Red River versus the Wild Rice River (see Enloe to Fargo flow ratios in Table 18), the Hickson and Enloe discharges were increased to the original Appendix A-2 POR discharges at Hickson. The 5-percent chance Enloe discharge remained as calculated, but the Hickson discharge was increased. The 4-percent chance event was not available in Appendix A-2 for making a comparison. The 2-percent chance event and 1-percent chance event discharges were revised with a more proportionally balanced split between the Wild Rice and Red River compared to the initial heavier weighting toward the Red River side. The 0.2-percent chance event discharge was increased on the Red River as its ratio was initially more heavily weighted to the Wild Rice side. Table 20 presents the final POR discharges to be used in Plan B modeling.

Table 18: Discharges Prior to Final Calibration (Not final)

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Fargo	13,865	19,831	21,400	26,000	33,000	43,500	66,000
Hickson	7,700	10,700	12,000	17,200	21,700	28,300	39,400
Enloe	8,000	11,800	13,000	18,100	22,300	29,300	38,600
Ratio, Enloe/Fargo	**0.58**	**0.60**	**0.61**	**0.70**	**0.68**	**0.67**	**0.58**

Table 19: Calibrated POR Discharges at Hickson and Enloe Gages

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Fargo	13,865	19,831	21,400	26,000	33,000	43,500	66,000
Hickson	8,400	11,400	12,000	16,000	21,300	28,300	38,700
Enloe	9,000	11,800	13,000	16,000	21,000	29,300	40,000
Ratio, Enloe/Fargo	**0.65**	**0.60**	**0.61**	**0.62**	**0.64**	**0.67**	**0.61**

Table 20: Final POR Peak Discharges

Return Period (year)	10	20	25	50	100	200	500
% Annual Chance Event	10	5	4	2	1	0.5	0.2
Drayton	56,300	75,000	81,100	102,000	124,500	148,800	182,900
Oslo	52,800	70,600	76,300	96,500	118,000	141,300	174,200
Grand Forks	50,500	67,300	72,000	91,700	112,000	134,000	165,000
Thompson	36,700	50,600	54,400	68,400	85,200	100,900	129,000
Halstad	29,800	39,900	43,200	54,600	66,900	80,200	99,200
Fargo	13,865	19,831	21,400	26,000	33,000	43,500	66,000
Hickson	8,400	11,400	12,000	16,000	21,300	28,300	38,700
Enloe	9,000	11,800	13,000	16,000	21,000	29,300	40,000

5. PLAN B – PERIOD OF RECORD BALANCED HYDROGRAPHS

USACE developed the balanced hydrographs for the EOE/WET hydrology throughout various stages of the FEIS and as necessary during the project. HMG developed hydrographs closely resembling balanced hydrographs using HEC-DSSVue and multipliers applied to each EOE/WET hydrograph ordinate. The EOE/WET balanced hydrographs and POR analysis hydrographs are shown in Exhibits 9 through 16 for all streamflow gages along the Red River.

Exhibits

Exhibit 1

Enloe Gage Frequency Curve POR vs EOE/WET

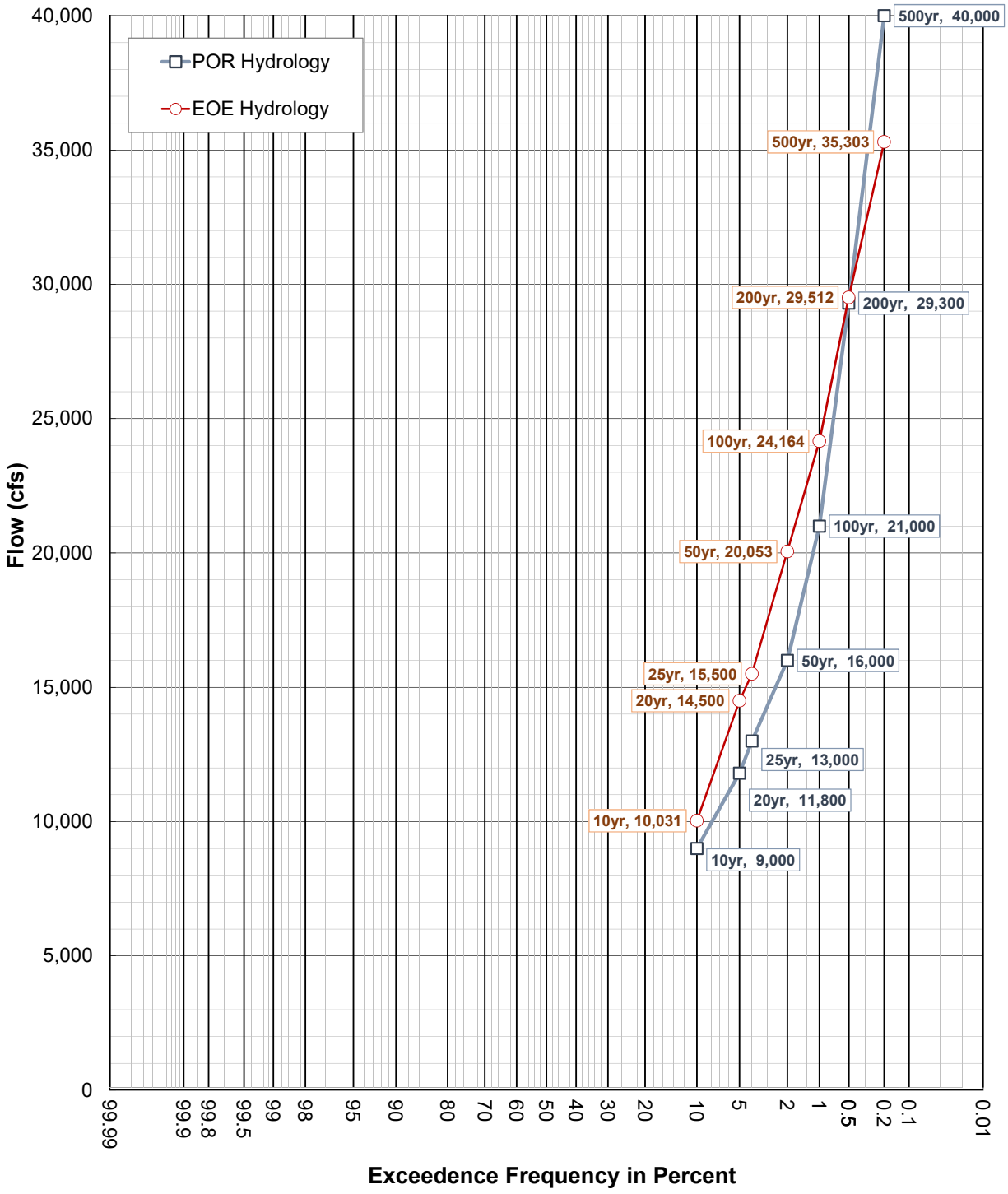


Exhibit 2

Hickson Gage Frequency Curve POR vs EOE/WET

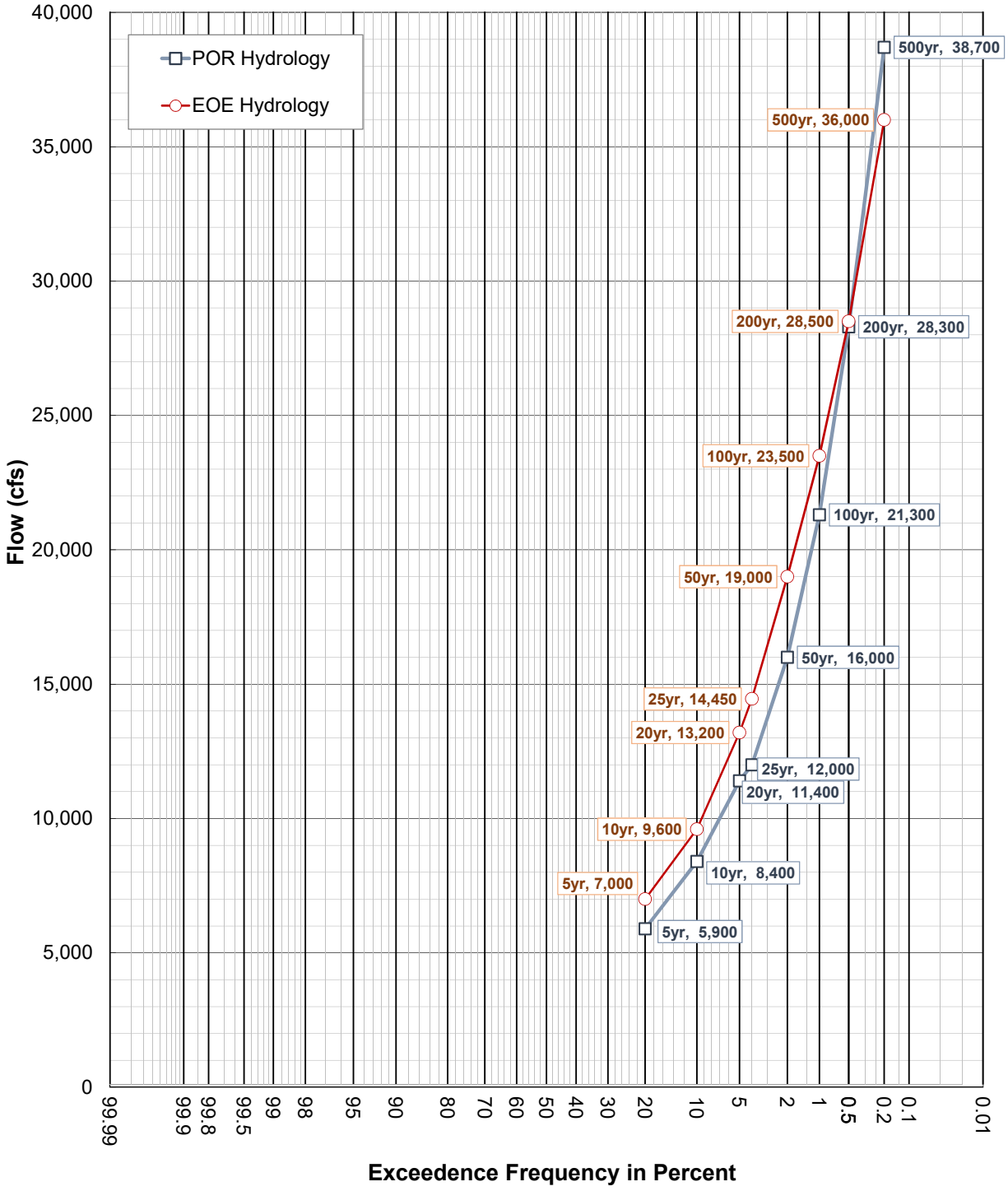


Exhibit 3

Fargo Gage Frequency Curve POR vs EOE/WET

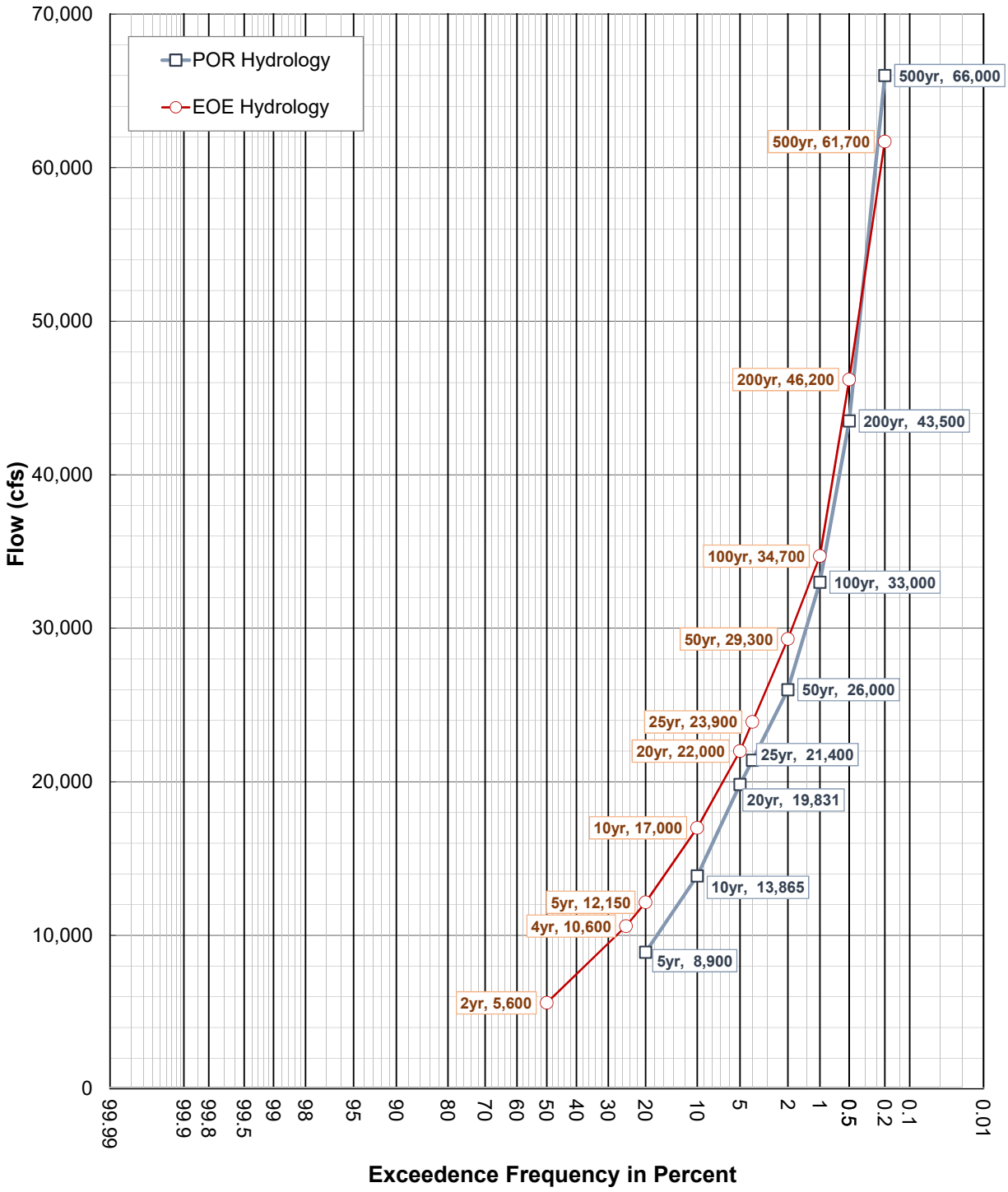


Exhibit 4

Halstad Gage Frequency Curve POR vs EOE/WET

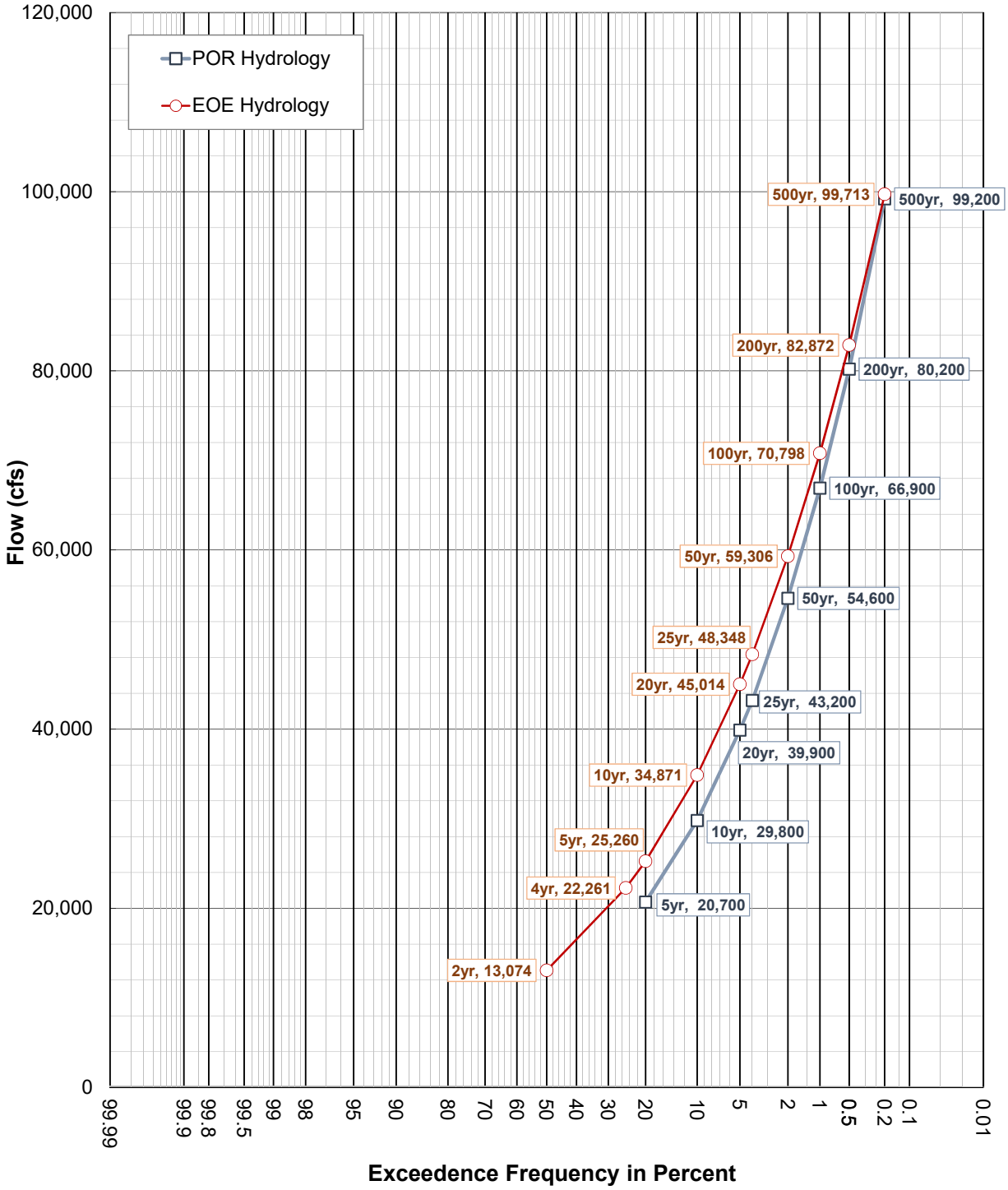


Exhibit 5

Thompson Gage Frequency Curve POR vs EOE/WET

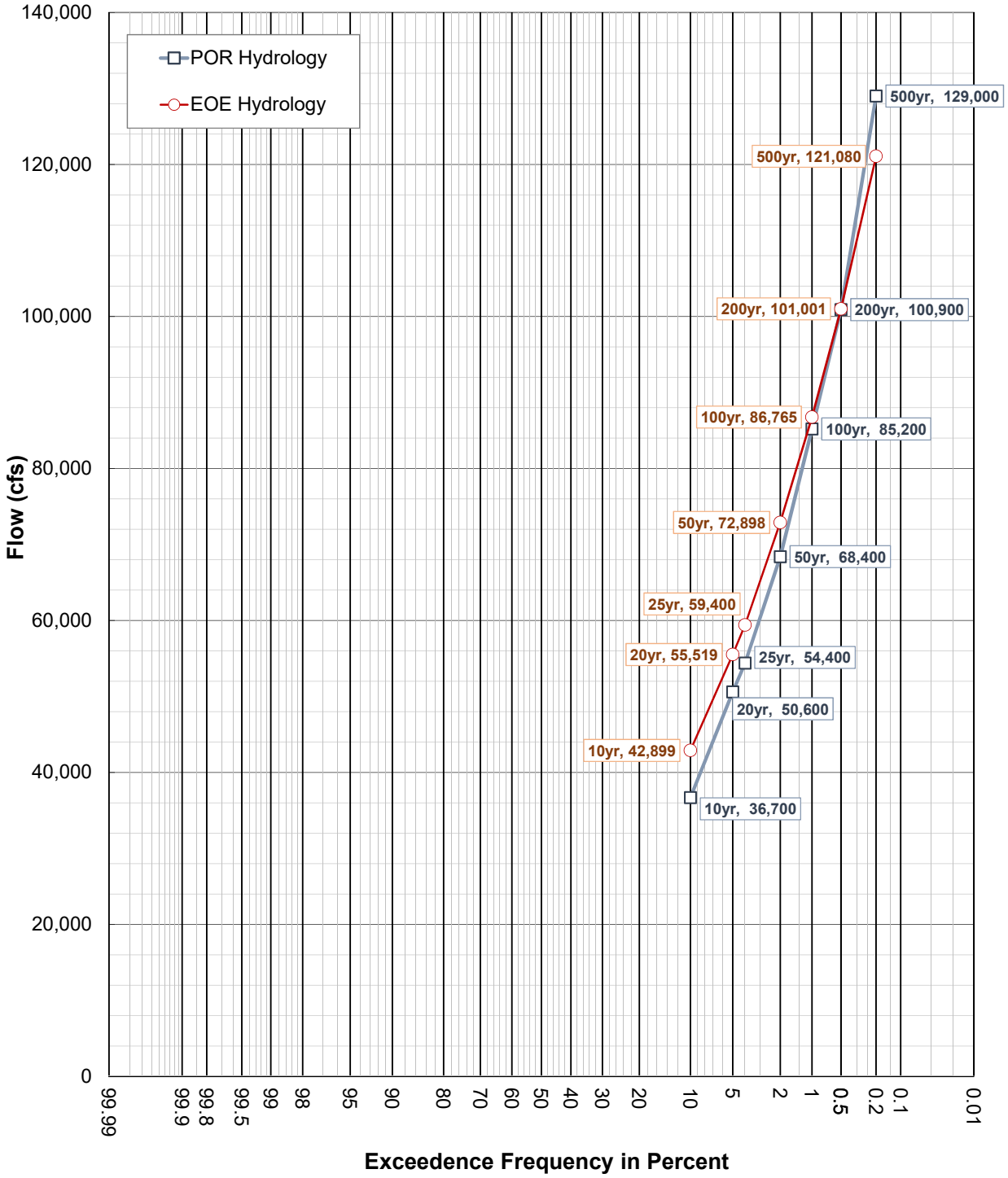


Exhibit 6

Grand Forks Gage Frequency Curve POR vs EOE/WET

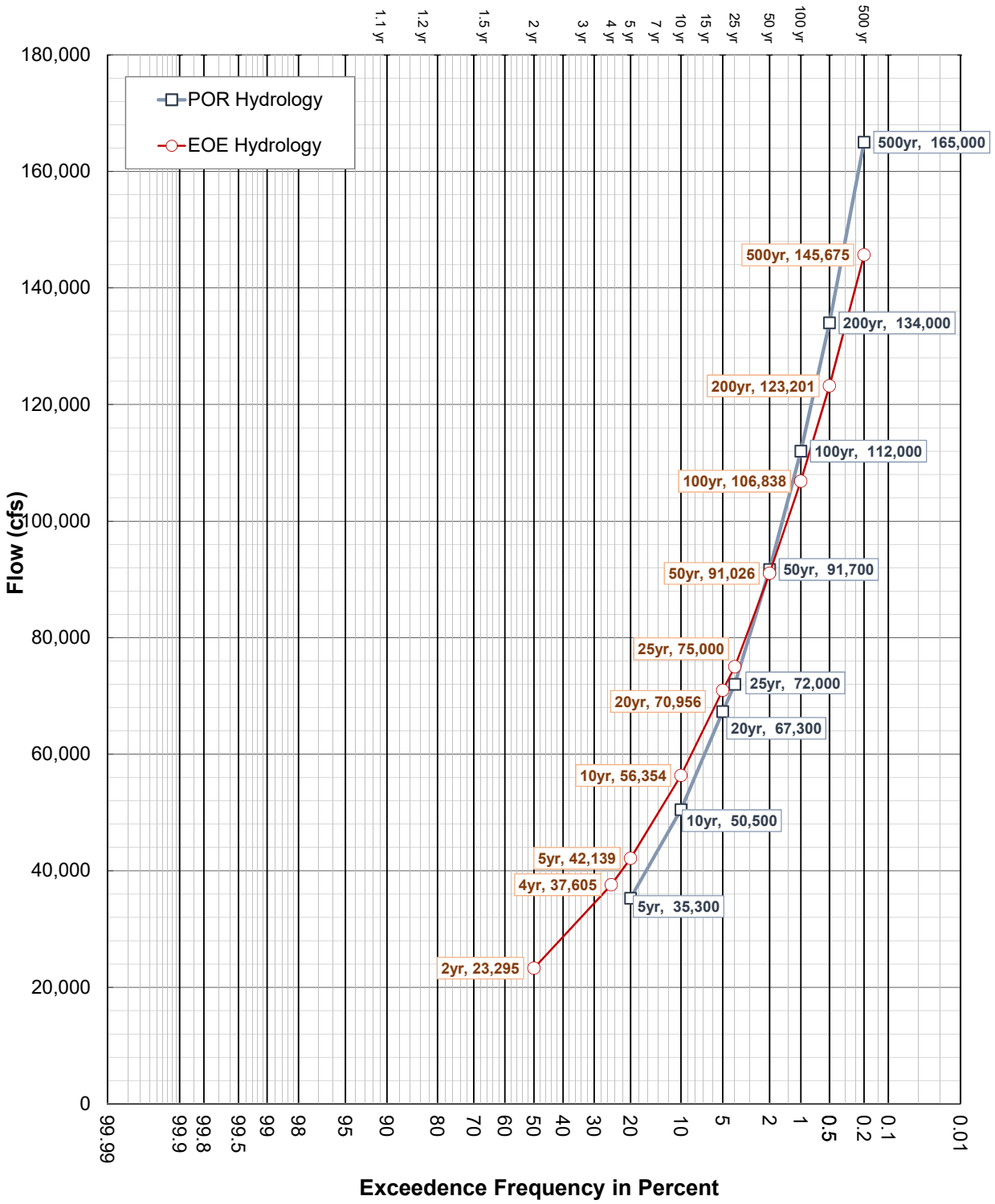


Exhibit 7

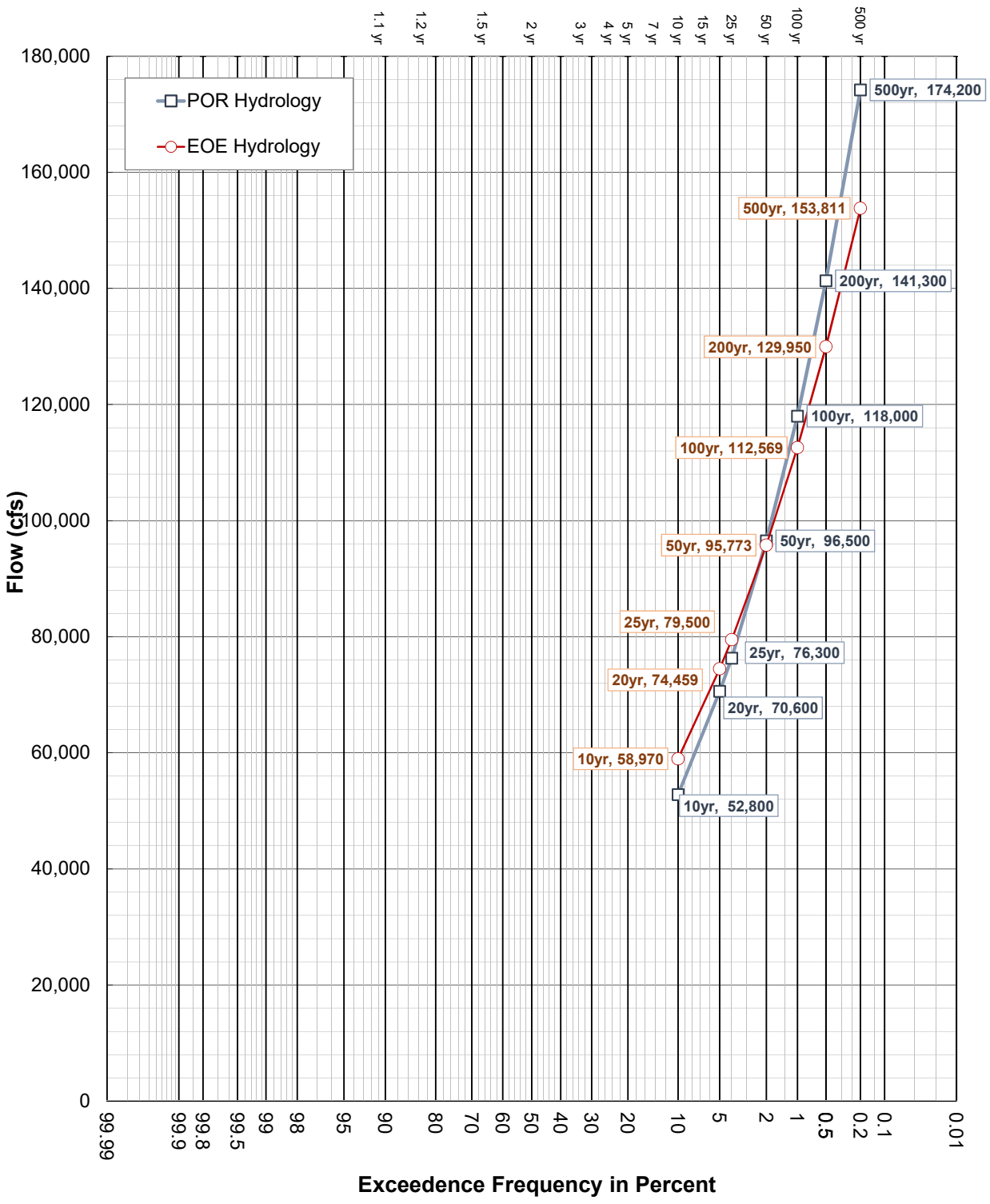

Oslo Gage Frequency Curve POR vs EOE
POR Hydrology
EOE Hydrology
Flow (cfs)
Exceedence Frequency in Percent
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1.1 yr
1.2 yr
1.5 yr
2 yr
3 yr
4 yr
5 yr
7 yr
10 yr
15 yr
25 yr
50 yr
100 yr
500 yr
99.99
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.01
500yr, 174,200
500yr, 153,811
200yr, 141,300
200yr, 129,950
100yr, 118,000
100yr, 112,569
50yr, 96,500
50yr, 95,773
25yr, 79,500
25yr, 76,300
20yr, 74,459
20yr, 70,600
10yr, 58,970
10yr, 52,800

Exhibit 8

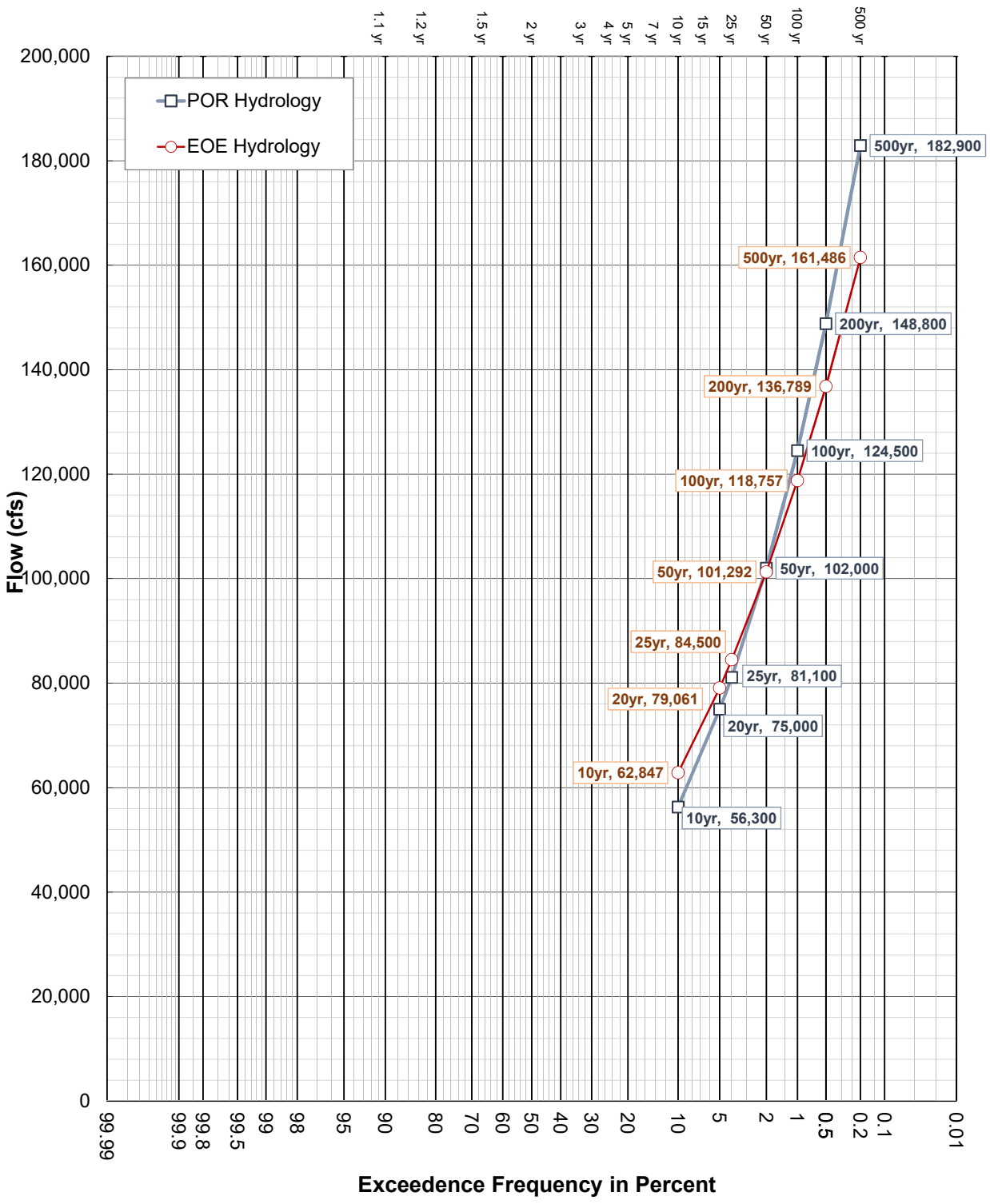

Drayton Gage Frequency Curve POR vs EOE
1.1 yr
1.2 yr
1.5 yr
2 yr
3 yr
4 yr
5 yr
7 yr
10 yr
15 yr
25 yr
50 yr
100 yr
500 yr
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Flow (cfs)
POR Hydrology
EOE Hydrology
500yr, 182,900
500yr, 161,486
200yr, 148,800
200yr, 136,789
100yr, 124,500
100yr, 118,757
50yr, 102,000
50yr, 101,292
25yr, 84,500
25yr, 81,100
20yr, 79,061
20yr, 75,000
10yr, 62,847
10yr, 56,300
99.99
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.01
Exceedence Frequency in Percent

Exhibit 9

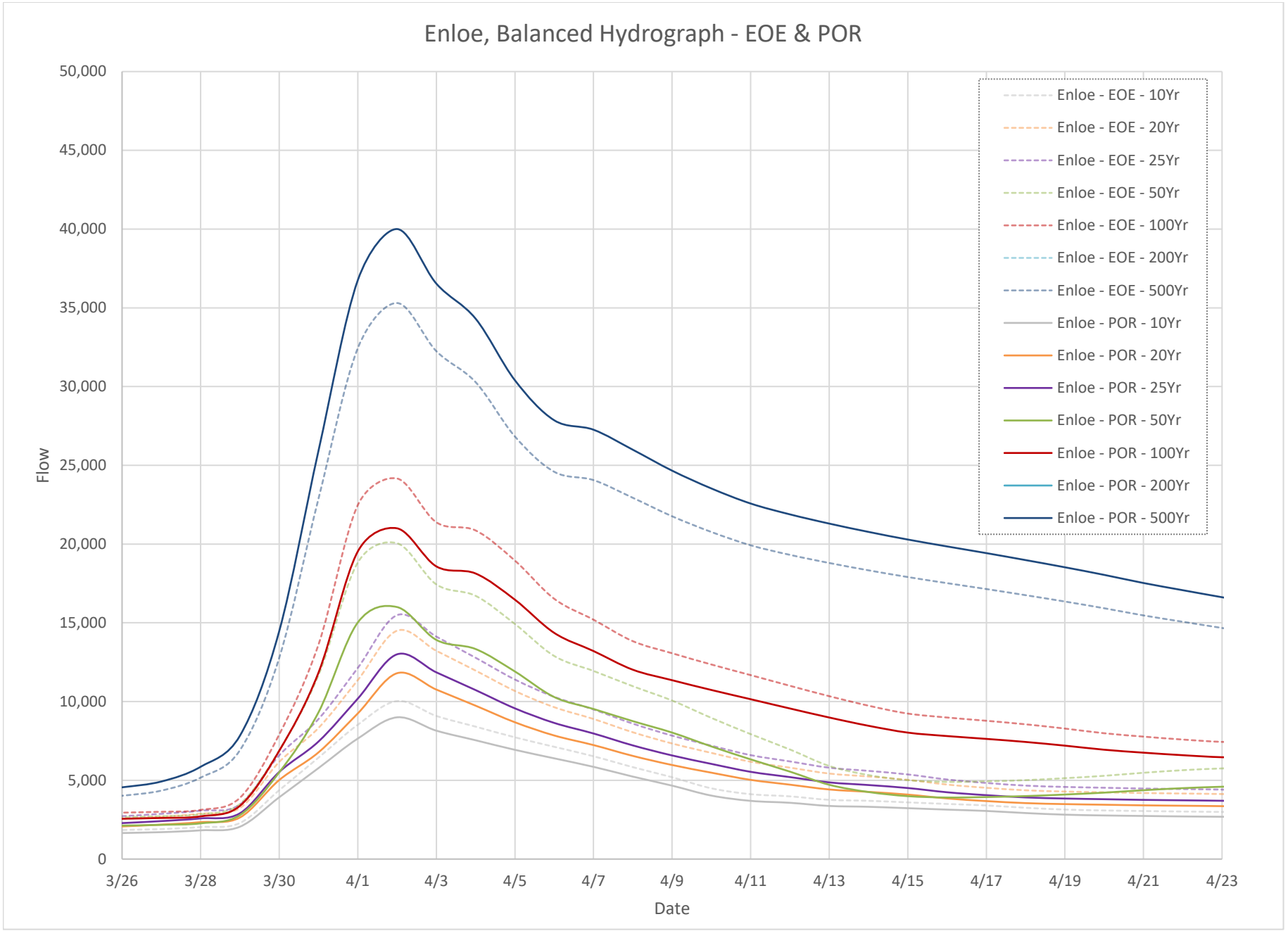
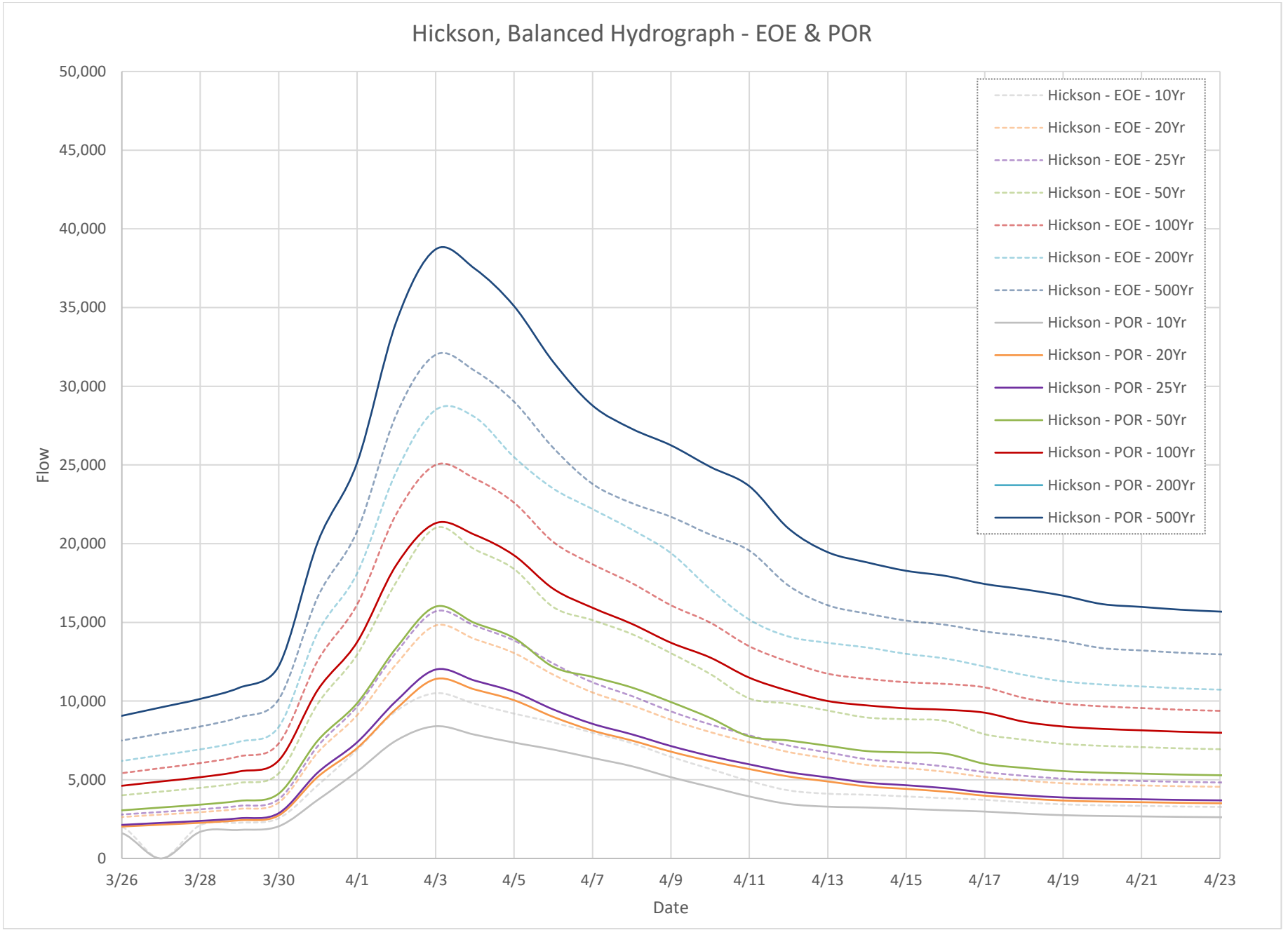

Enloe, Balanced Hydrograph - EOE & POR
Flow
Date
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
3/26
3/28
3/30
4/1
4/3
4/5
4/7
4/9
4/11
4/13
4/15
4/17
4/19
4/21
4/23
Enloe - EOE - 10Yr
Enloe - EOE - 20Yr
Enloe - EOE - 25Yr
Enloe - EOE - 50Yr
Enloe - EOE - 100Yr
Enloe - EOE - 200Yr
Enloe - EOE - 500Yr
Enloe - POR - 10Yr
Enloe - POR - 20Yr
Enloe - POR - 25Yr
Enloe - POR - 50Yr
Enloe - POR - 100Yr
Enloe - POR - 200Yr
Enloe - POR - 500Yr

Exhibit 10


Hickson, Balanced Hydrograph - EOE & POR
Flow
Date
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45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
3/26
3/28
3/30
4/1
4/3
4/5
4/7
4/9
4/11
4/13
4/15
4/17
4/19
4/21
4/23
Hickson - EOE - 10Yr
Hickson - EOE - 20Yr
Hickson - EOE - 25Yr
Hickson - EOE - 50Yr
Hickson - EOE - 100Yr
Hickson - EOE - 200Yr
Hickson - EOE - 500Yr
Hickson - POR - 10Yr
Hickson - POR - 20Yr
Hickson - POR - 25Yr
Hickson - POR - 50Yr
Hickson - POR - 100Yr
Hickson - POR - 200Yr
Hickson - POR - 500Yr

Exhibit 11

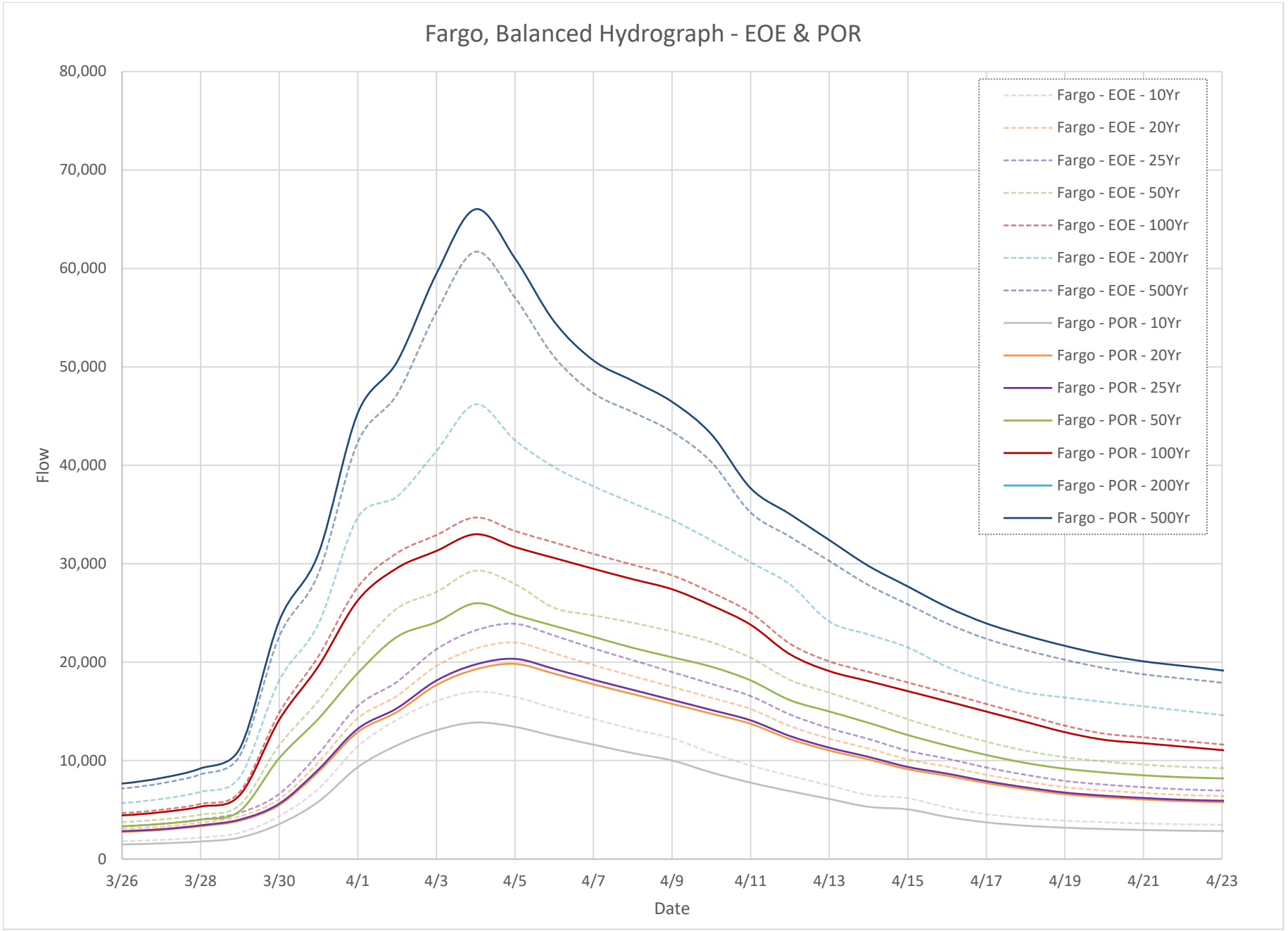

Fargo, Balanced Hydrograph - EOE & POR
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Flow
3/26
3/28
3/30
4/1
4/3
4/5
4/7
4/9
4/11
4/13
4/15
4/17
4/19
4/21
4/23
Date
Fargo - EOE - 10Yr
Fargo - EOE - 20Yr
Fargo - EOE - 25Yr
Fargo - EOE - 50Yr
Fargo - EOE - 100Yr
Fargo - EOE - 200Yr
Fargo - EOE - 500Yr
Fargo - POR - 10Yr
Fargo - POR - 20Yr
Fargo - POR - 25Yr
Fargo - POR - 50Yr
Fargo - POR - 100Yr
Fargo - POR - 200Yr
Fargo - POR - 500Yr

Exhibit 12

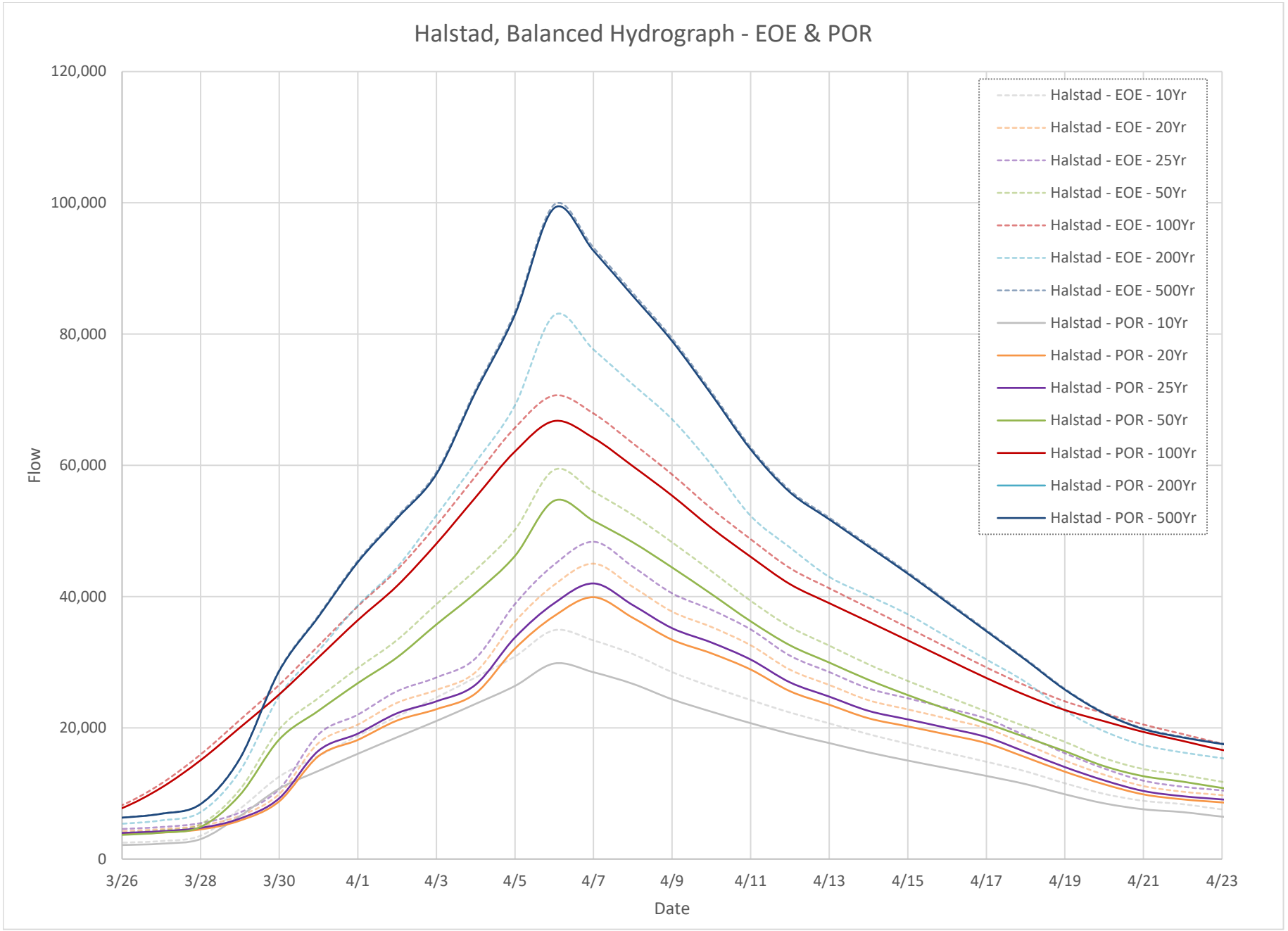
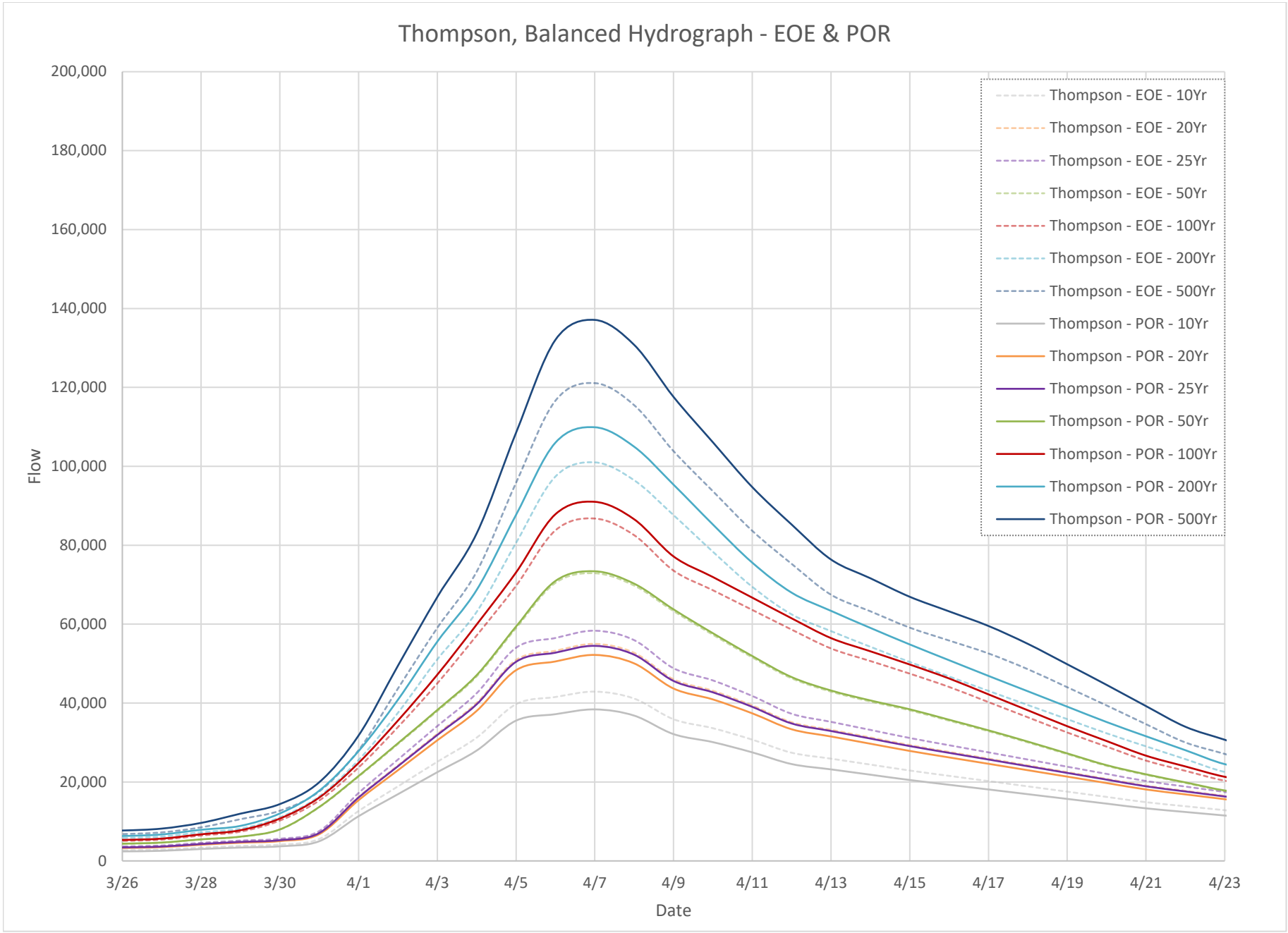

Halstad, Balanced Hydrograph - EOE & POR
120,000
100,000
80,000
60,000
40,000
20,000
0
Flow
3/26
3/28
3/30
4/1
4/3
4/5
4/7
4/9
4/11
4/13
4/15
4/17
4/19
4/21
4/23
Date
Halstad - EOE - 10Yr
Halstad - EOE - 20Yr
Halstad - EOE - 25Yr
Halstad - EOE - 50Yr
Halstad - EOE - 100Yr
Halstad - EOE - 200Yr
Halstad - EOE - 500Yr
Halstad - POR - 10Yr
Halstad - POR - 20Yr
Halstad - POR - 25Yr
Halstad - POR - 50Yr
Halstad - POR - 100Yr
Halstad - POR - 200Yr
Halstad - POR - 500Yr

Exhibit 13


Thompson, Balanced Hydrograph - EOE & POR
Flow
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140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
3/26
3/28
3/30
4/1
4/3
4/5
4/7
4/9
4/11
4/13
4/15
4/17
4/19
4/21
4/23
Date
Thompson - EOE - 10Yr
Thompson - EOE - 20Yr
Thompson - EOE - 25Yr
Thompson - EOE - 50Yr
Thompson - EOE - 100Yr
Thompson - EOE - 200Yr
Thompson - EOE - 500Yr
Thompson - POR - 10Yr
Thompson - POR - 20Yr
Thompson - POR - 25Yr
Thompson - POR - 50Yr
Thompson - POR - 100Yr
Thompson - POR - 200Yr
Thompson - POR - 500Yr

Exhibit 14

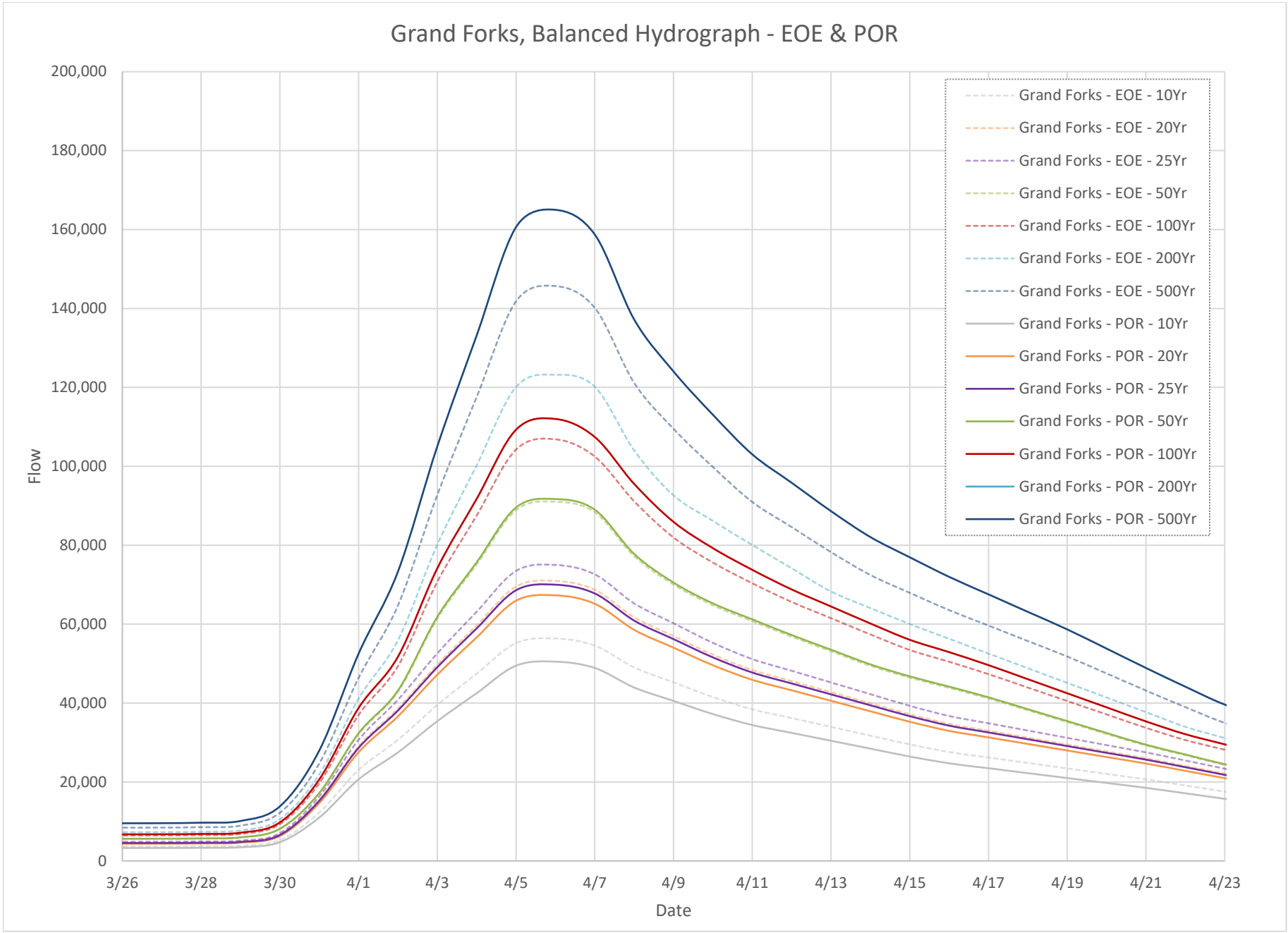

Grand Forks, Balanced Hydrograph - EOE & POR
Flow
Date
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
3/26
3/28
3/30
4/1
4/3
4/5
4/7
4/9
4/11
4/13
4/15
4/17
4/19
4/21
4/23
Grand Forks - EOE - 10Yr
Grand Forks - EOE - 20Yr
Grand Forks - EOE - 25Yr
Grand Forks - EOE - 50Yr
Grand Forks - EOE - 100Yr
Grand Forks - EOE - 200Yr
Grand Forks - EOE - 500Yr
Grand Forks - POR - 10Yr
Grand Forks - POR - 20Yr
Grand Forks - POR - 25Yr
Grand Forks - POR - 50Yr
Grand Forks - POR - 100Yr
Grand Forks - POR - 200Yr
Grand Forks - POR - 500Yr

Exhibit 15

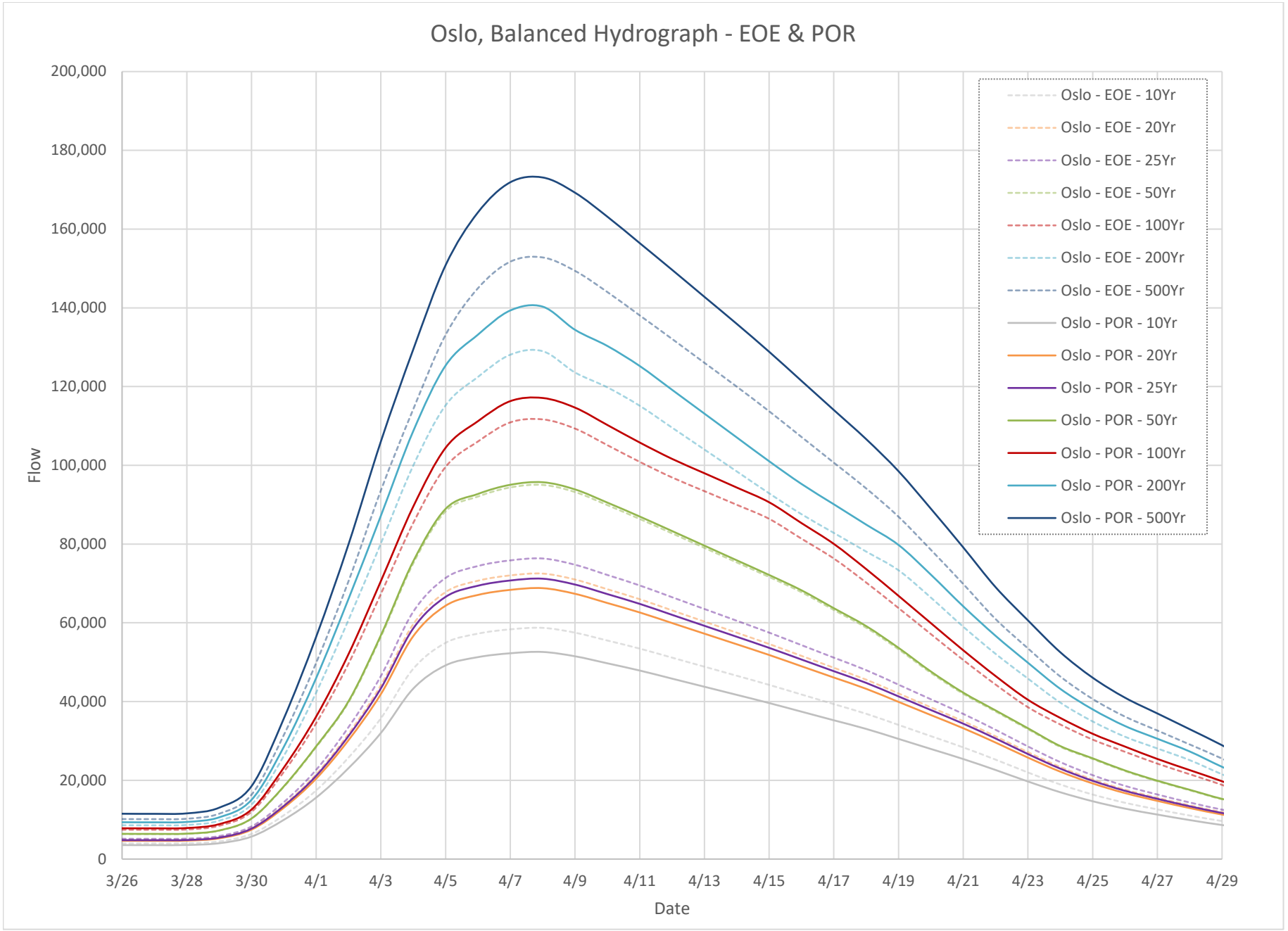
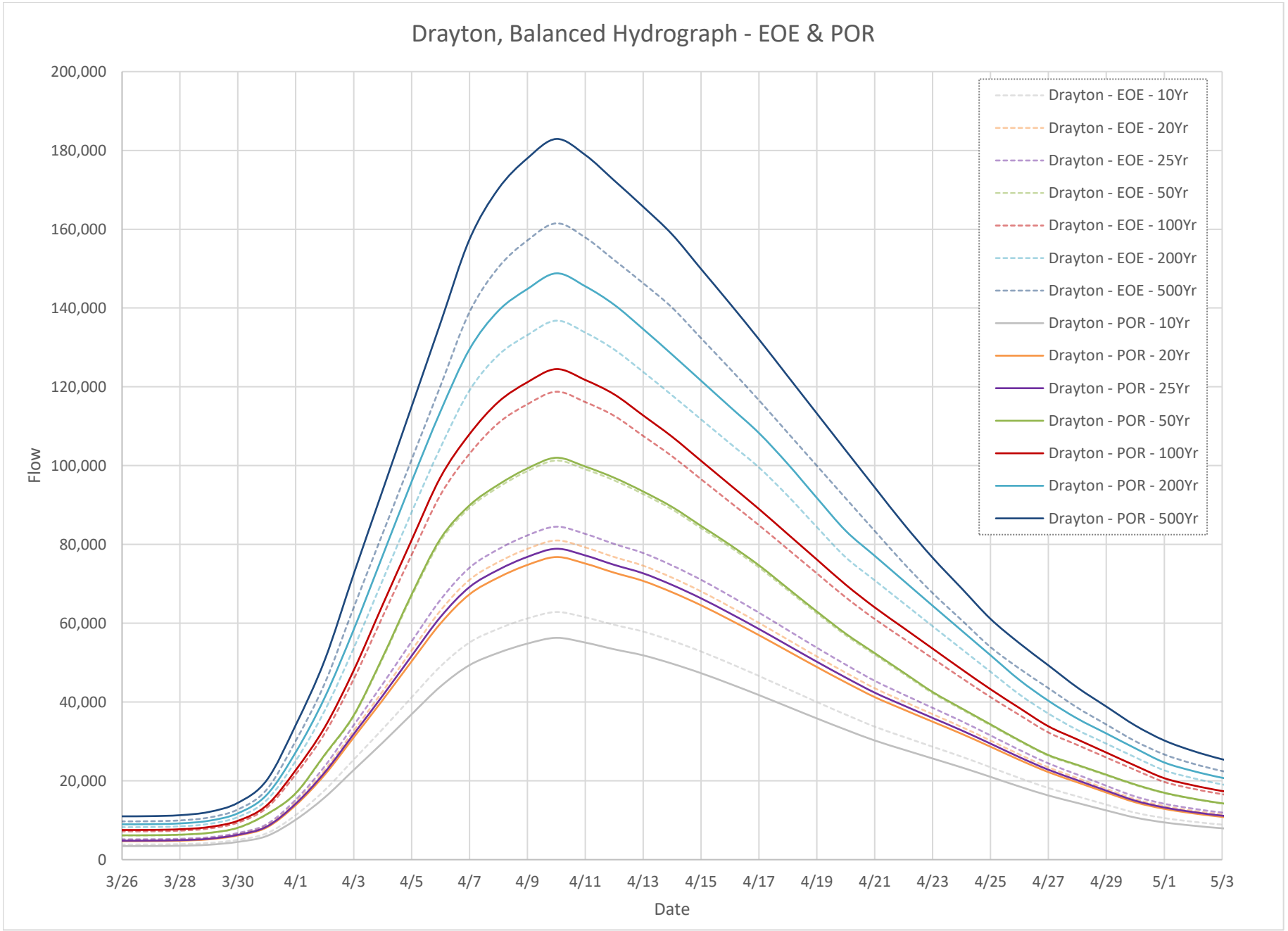

Oslo, Balanced Hydrograph - EOE & POR
Flow
Date
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
3/26
3/28
3/30
4/1
4/3
4/5
4/7
4/9
4/11
4/13
4/15
4/17
4/19
4/21
4/23
4/25
4/27
4/29
Oslo - EOE - 10Yr
Oslo - EOE - 20Yr
Oslo - EOE - 25Yr
Oslo - EOE - 50Yr
Oslo - EOE - 100Yr
Oslo - EOE - 200Yr
Oslo - EOE - 500Yr
Oslo - POR - 10Yr
Oslo - POR - 20Yr
Oslo - POR - 25Yr
Oslo - POR - 50Yr
Oslo - POR - 100Yr
Oslo - POR - 200Yr
Oslo - POR - 500Yr

Exhibit 16


Drayton, Balanced Hydrograph - EOE & POR
Flow
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
3/26
3/28
3/30
4/1
4/3
4/5
4/7
4/9
4/11
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4/15
4/17
4/19
4/21
4/23
4/25
4/27
4/29
5/1
5/3
Date
Drayton - EOE - 10Yr
Drayton - EOE - 20Yr
Drayton - EOE - 25Yr
Drayton - EOE - 50Yr
Drayton - EOE - 100Yr
Drayton - EOE - 200Yr
Drayton - EOE - 500Yr
Drayton - POR - 10Yr
Drayton - POR - 20Yr
Drayton - POR - 25Yr
Drayton - POR - 50Yr
Drayton - POR - 100Yr
Drayton - POR - 200Yr
Drayton - POR - 500Yr

Attachment 2

DRAFT

US Army Corps of Engineers®
St. Paul District

Southern Embankment Wind-Wave Analysis

Fargo Moorhead Metropolitan Area
Flood Risk Management Project

Southern Embankment

Engineering and Design Phase

Doc Version: Draft

31 May 2018

C.1 OVERVIEW

The revised alignment of the Southern Embankment for the Fargo-Moorhead Metropolitan Flood Risk Management Project (FMM Project) requires a reevaluation of the wind-wave analysis to ensure that the top of dam elevation of 929.0 feet (all elevations in this attachment are in NAVD 88) is sufficient to "assure that failure of the dam will not result from wind set-up, wave action, uncertainties in analytical procedures, and uncertainties in project function in combination with the most critical pool elevation" as stated in ER 1110-8-2 (FR), *Inflow Design Floods for Dams and Reservoirs* (USACE, 1991). These uncertainties include the uncertainty in the shape, duration, and peak value of the inflow hydrograph, uncertainties in operation of the gated structures, uncertainty in climate change, wind and precipitation estimates, and model uncertainty. The most critical pool elevation for the design of this project is at elevation 924.0 feet, which corresponds to the maximum pool that will be maintained at the structures before flood-fighting downstream is abandoned and the Red and Wild Rice River structures are opened to maintain dam safety; flooding the Fargo-Moorhead area in the process.

While a simple one-dimensional fetch length calculation can be used to determine wave and wind setup estimates at a structure, it may not fully capture the complexities of a pool like the FMM staging area. The new alignment of the Southern Embankment is such that adverse winds can approach from a wide range of directions. Additionally, the shallow depths of the pool and presence of raised roadways that intersect the pool create disconnected wind fetches and areas of energy dissipation (i.e. waves breaking on roadways) that are difficult to capture in a simplified 1D approach. For these reasons, a coupled 2D modeling approach is considered for this effort using a 2D hydrodynamic model (Adaptive Hydraulicsmodel, or AdH) to model wind setup and a 2D wave growth and transformation model (Steady State Spectral Wave, or STWAVE) to capture the wave height, wave period, and wave direction along the entire structure length. These wave characteristic outputs can then be used to calculate wave runup and wave overtopping values. This calculated required height, in combination with the vertical rise in water surface calculated in the wind setup values, can be used to ensure the top of dam elevation is designed to a sufficient height above the maximum pool level.

Traditionally for dam freeboard assessment, the required height above the Still-Water Level (SWL) is calculated as the wind setup plus 2-percent wave runup value. This means that for a certain set of wind conditions, only 2% of all wave runup values would exceed this elevation. According to the Dutch guidance for wave runup and overtopping calculation (EurOtop Manual, 2007) "the choice for 2% has been made long ago and was probably arbitrary" and "it can be concluded that the choice for the 2% value was made in 1936, but the reason why is not clear as the design report itself could not be retrieved." The current state of the practice focuses more on the calculation of wave overtopping rates rather than wave runup alone because the rate at which waves and water flow over the structure can be compared with rates that are thought to be hazardous to the integrity of the structure. The calculation of wave runup does not give any indication if the waves that do exceed the crest could initiate a failure of an embankment structure. Corps' guidance for the design of dams (ER 1110-8-2) also states that "zero over-wash is not always required under infrequent high pool conditions, but it is required that the over-wash will not be of such a magnitude and duration as to threaten the safety of the dam." Therefore, while this wind-wave analysis will consider the calculation of the required top of dam elevation based on both limiting wave overtopping rates and on containing the wave runup elevation, the primary focus of

this effort will be to ensure the top of dam limits wave overtopping to acceptable levels for the embankment that is being designed.

An overview map of the Southern Embankment and level pools of 924.0 feet and 929.0 feet is shown in Figure C-1. The Southern Embankment (shown in red) is generally aligned east-west, with three gated control structures (Red River of the North Structure, Wild Rice River Structure, and the Diversion Inlet Structure) located along the alignment. The Diversion Inlet structure passes flows downstream around the Fargo-Moorhead area through a 30-mile long diversion channel. The Oxbow-Hickson-Bakke (OHB) ring levee provides flood risk management for three local communities with the FMM project in place.

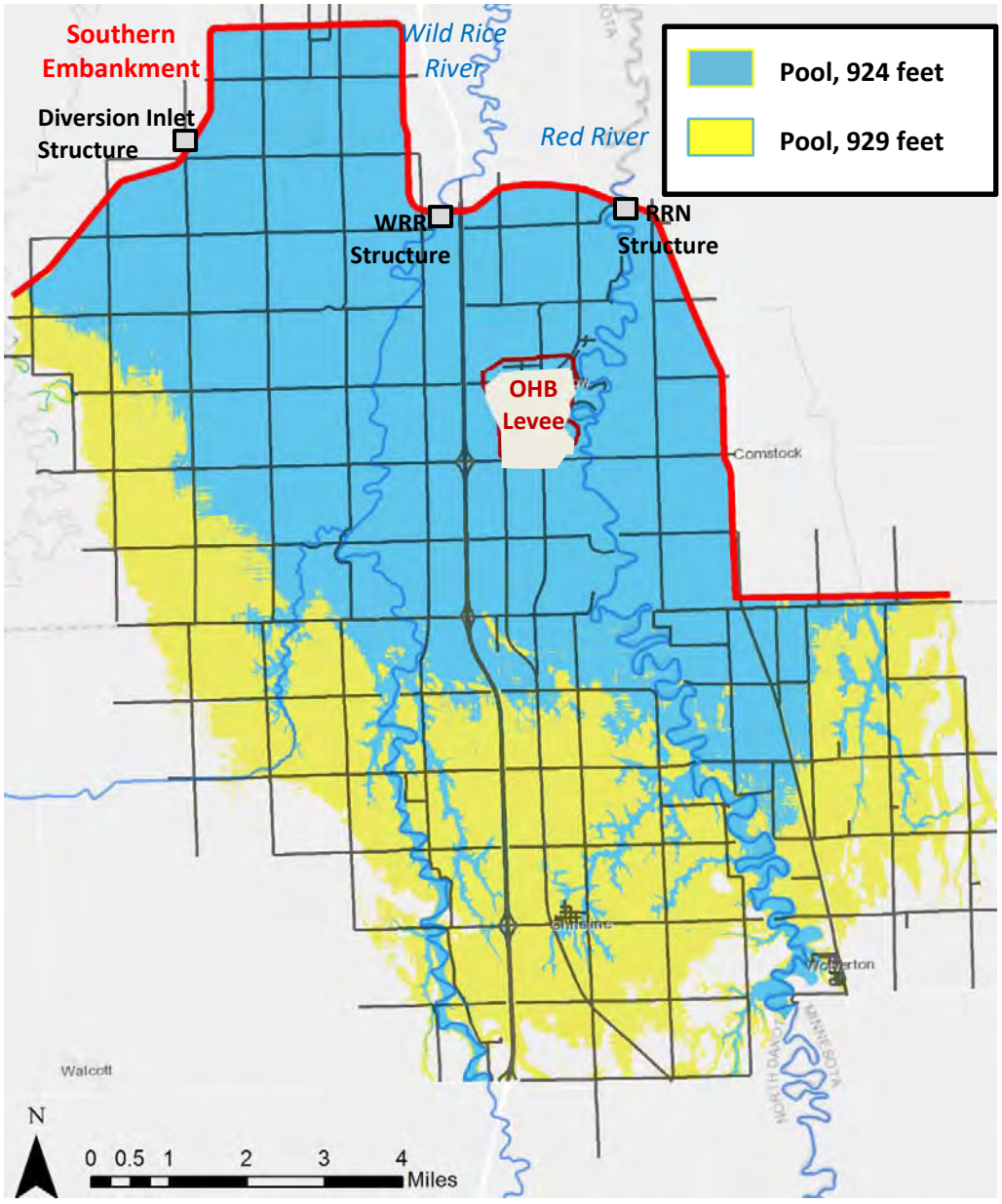

Figure C-1: Overview Map for Wind-Wave Analysis

C.2 METHODS

C.2.1 Wind Analysis

Previous analysis for fetch-limited duration winds of around 1 hour in duration (adjusted for over-water conditions) give wind frequency estimates as shown in Table C-1. These values were developed as part of the design for OHB ring levee (USACE, 2015) and represent all-seasonal, all-directional winds.

Table C- 1: Fetch-limited, adjusted wind speed frequencies

Annual Chance Exceedance (ACE)	Return Period	Wind Speed (mph)
1%	100	48.8
2%	50	47.4
10%	10	44.5
50%	2	40.9

The wind speeds for frequencies between the 1% and 50% ACE are bracketed by wind speeds of 40 mph and 50 mph. Therefore, the wind setup and wave calculations are made for those two wind speeds, allowing for interpolation between to roughly approximate the various frequency wind speeds.

C.2.2 Hydrodynamic Model

The hydrodynamic model used for calculating wind setup is AdH. The irregular mesh model was developed in metric units with spacing of 30 meters along roadways, 60 meters along riverine features, up to 250 meters in open field areas. Figure C-2 shows an example of the AdH element spacing. The roadways are artificially widened to capture a broad crested structure rather than a modeled triangular structure that could allow flow to "leak" through artificial low points. Culverts are not included in this model but are not conveying much total volume compared to the extreme flood magnitudes considered for this effort. Additionally, Interstate 29 which runs north to south through the project area has been raised to the 1% pool elevation of 922.5 feet.

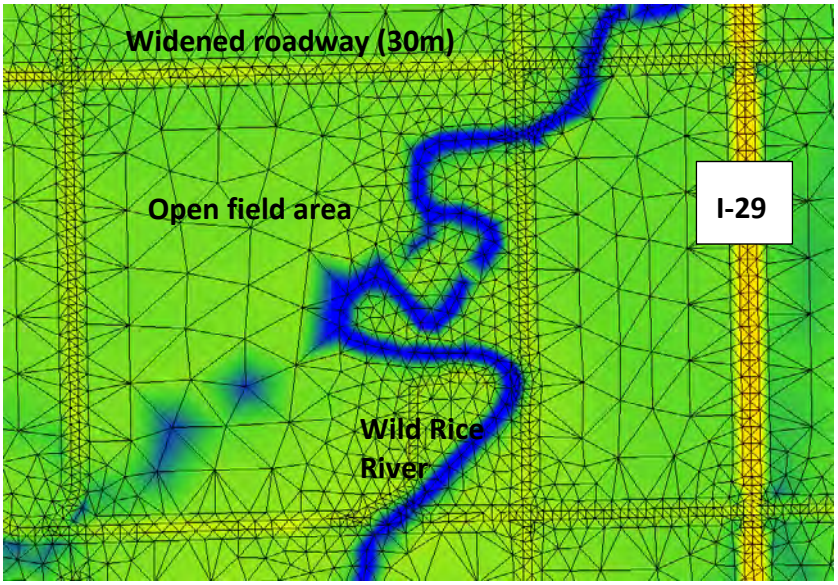

Figure C-2: Typical irregular mesh element spacing

The AdH mesh extends to the entire area that would be inundated by a pool level of 929 feet elevation, which is equivalent to the top of dam elevation, as shown in Figure C-3.

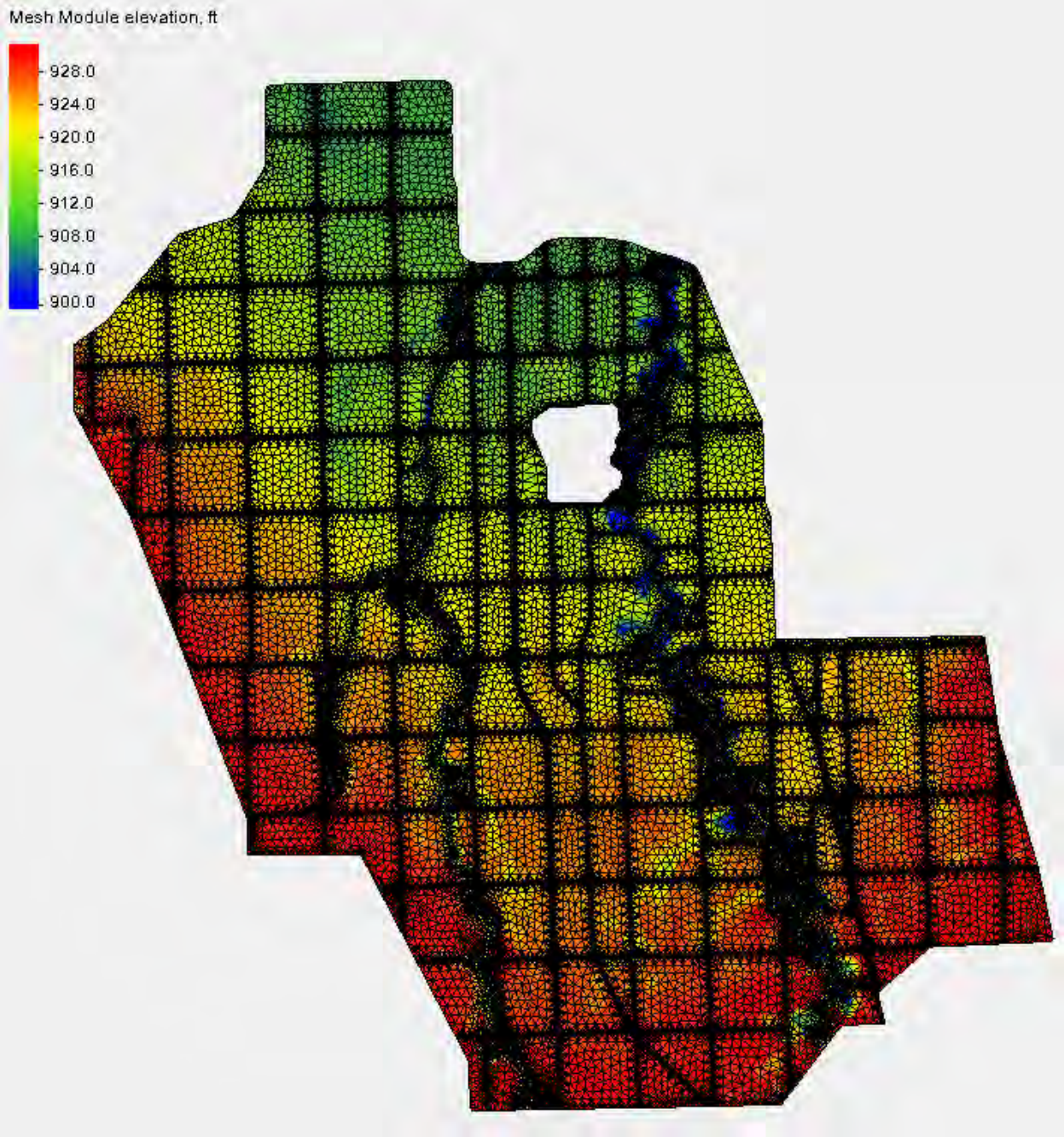

Figure C-3: AdH Mesh with elevation contours

The hydrologic event modeled for this effort is the maximum pool level maintained before the gated structures are fully opened to maintain dam safety. This event, which is associated with an inflow of less than half the PMF inflow, results in a water surface elevation of 924.0 feet at the embankment and structures and has a 1/2000 annual chance exceedance probability. The large inflow associated with a maximum pool event causes a sloping water surface to be a more accurate assumption than a flat pool

of 924.0 feet. To capture this sloping pool, an inflow of 102,000 cfs is modeled at the upstream end to reflect the appropriate hydrologic conditions. The results of this sloping pool are shown in Figure C-4.

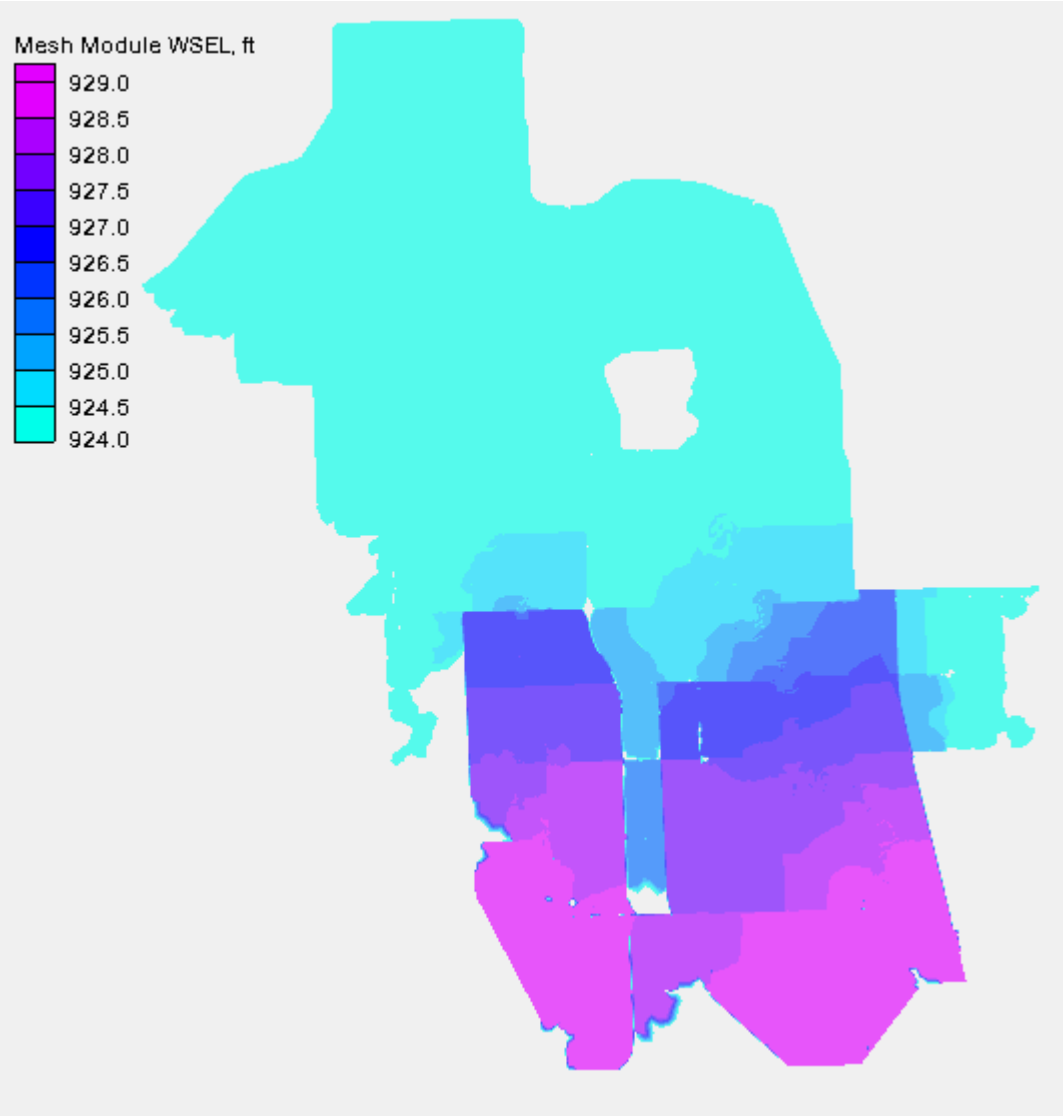

Figure C-4: Water surface elevations accounting for sloping pool with 102,000 cfs inflow

The sloping pool allows for more accurate wind fetches and average depths across the wind fetch to produce more realistic wind setup and wave height values. The downstream boundary is controlled at each of the hydraulic structures (Diversion Inlet, Wild Rice River Structure, and Red River Structure) by holding an elevation of 924.0 feet. This boundary condition limits wind setup from growing immediately at the structure, however, due to the large capacity of the gated structures this assumption is viewed as realistic because the operator would not allow the pool to go higher than the maximum pool simply because it may be a wind-induced rise.

C.2.3 Wave Growth & Transformation Model

STWAVE model is a regular gridded model, meaning that the x and y length of each cell are constant. This model was setup with a 30m by 30m cell size. The depth value for each cell was based on the

sloping water surface hydraulic profile generated in AdH. Each SWTAVE simulation for the various wind directions and wind speeds assumed the same depth values, so additional depth due to wind setup was not included in the wave calculation. This was a simplifying assumption that allowed for a drastically reduced modeling effort with a slight decrease in model accuracy. Since wind-set-up is not included in the simulation, the depths passed to STWAVE will be smaller than in reality, which could result in artificially lower wave heights, if the waves are depth-limited.

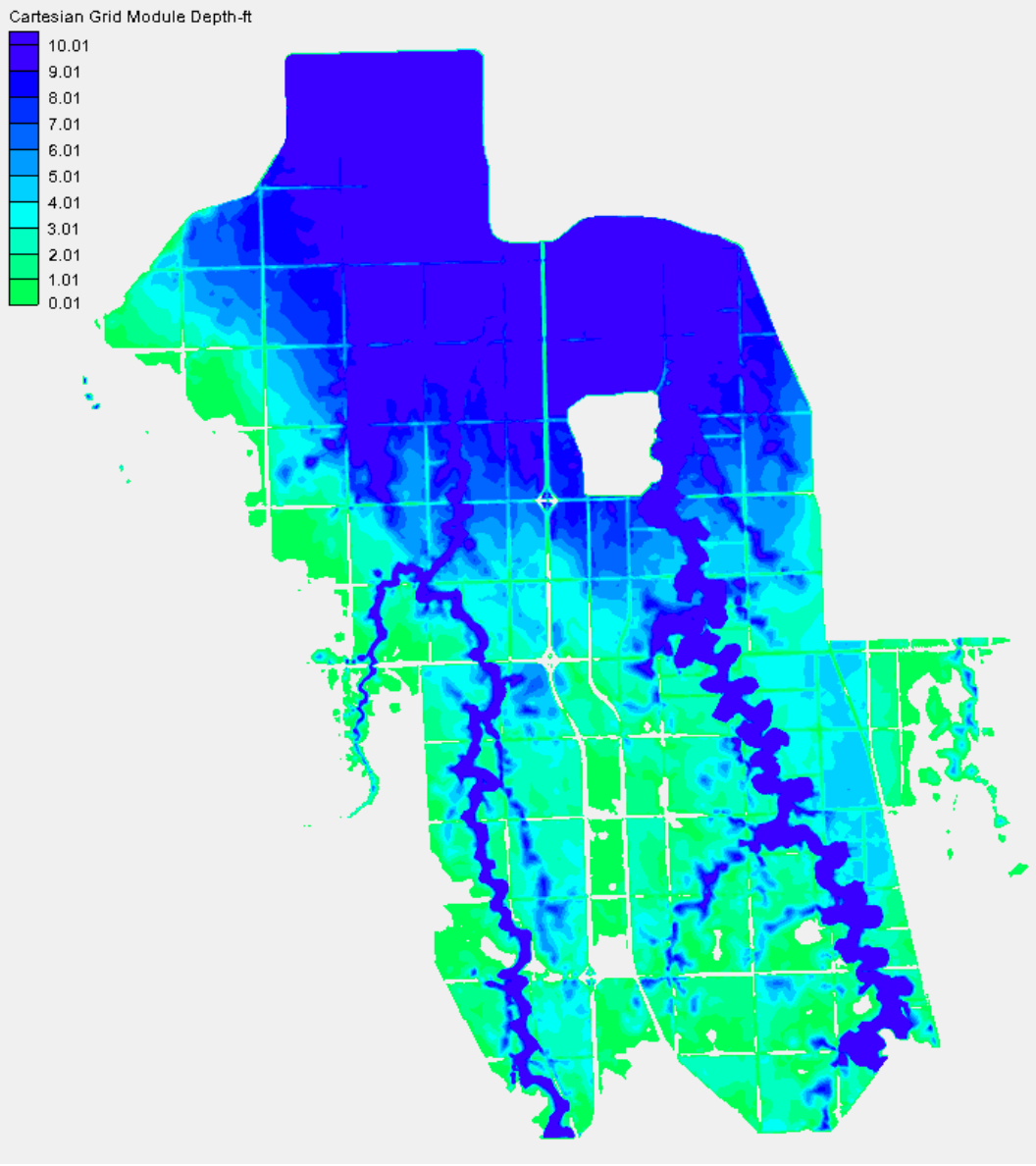

Figure C-5: Overview of depth data for the STWAVE model

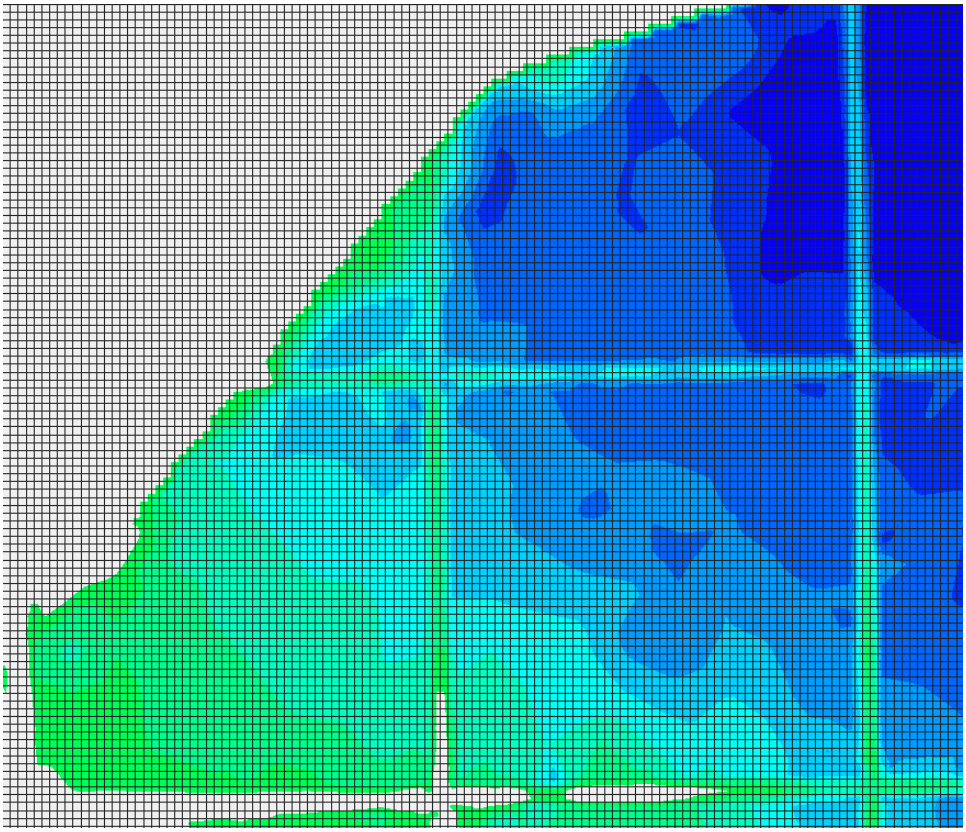

Figure C-6: Selected area of the 2D regular grid STWAVE model showing the fidelity of 30 meter cells

C.3 RESULTS

C.3.1 Wave Height, Period, and Direction Results

See Appendix 1 for the wave height and wave direction results for the 9 modeled wind directions and 2 modeled wind speeds. See supporting file “FMM_WindWave_Results_20180405.xlsm” for the full wave characteristic results.

C.3.2 Wind Setup Results

See Appendix 2 for the wind setup results for the 9 modeled wind directions and 2 modeled wind speeds. See supporting file “FMM_WindWave_Results_20180405.xlsm” for the full wind setup results.

C.3.3 Wave Overtopping and Wave Runup Results

The required top of dam elevation was calculated in two ways. The primary method used in this analysis was to determine the required height to limit wave overtopping rates to acceptable levels. The following equation (van der Meer and Janssen) from the Coastal Engineering Manual was selected:

Wave overtopping equation:

Table VI-5-11
Overtopping Formula by van der Meer and Janssen (1995)

Straight and bermed impermeable slopes including influence of surface roughness, shallow foreshore, oblique, and short-crested waves. Figures VI-5-14a and VI-5-14b.

$\xi_{op} < 2$

$$\frac{q}{\sqrt{g H_s^3}} \sqrt{\frac{s_{op}}{\tan\alpha}} = 0.06 \exp\left(-5.2 \frac{R_c}{H_s} \frac{\sqrt{s_{op}}}{\tan\alpha} \frac{1}{\gamma_f \gamma_b \gamma_h \gamma_\beta} \right) \qquad (VI\text{-}5\text{-}24)$$

application range: $0.3 < \frac{R_c}{H_s} \frac{\sqrt{s_{op}}}{\tan\alpha} \frac{1}{\gamma_f \gamma_b \gamma_h \gamma_\beta} < 2$

Uncertainty: Standard deviation of factor 5.2 is $\sigma = 0.55$ (See Figure VI-5-15).

The wave heights, periods, and embankment slope are such that the breaker parameter (ξop) for all conditions is below 2, so this equation is appropriate. An allowable overtopping rate (q) of 0.01 cfs/ft was selected to use to solve for the required height (Rc). Reduction factors (γ) were not considered (i.e. set to 1) with the exception of γβ, which was estimated from the angle between the wave direction angle and the orientation of the embankment. The slope of the embankment (tan α) was set to 1:4.

Using the wave overtopping equation and the 50 mph wave and wind setup results, the required design elevation does not exceed 929 feet at any location. Figure C-7 shows the summary for all wind directions along the Southern Embankment alignment, from west to east.

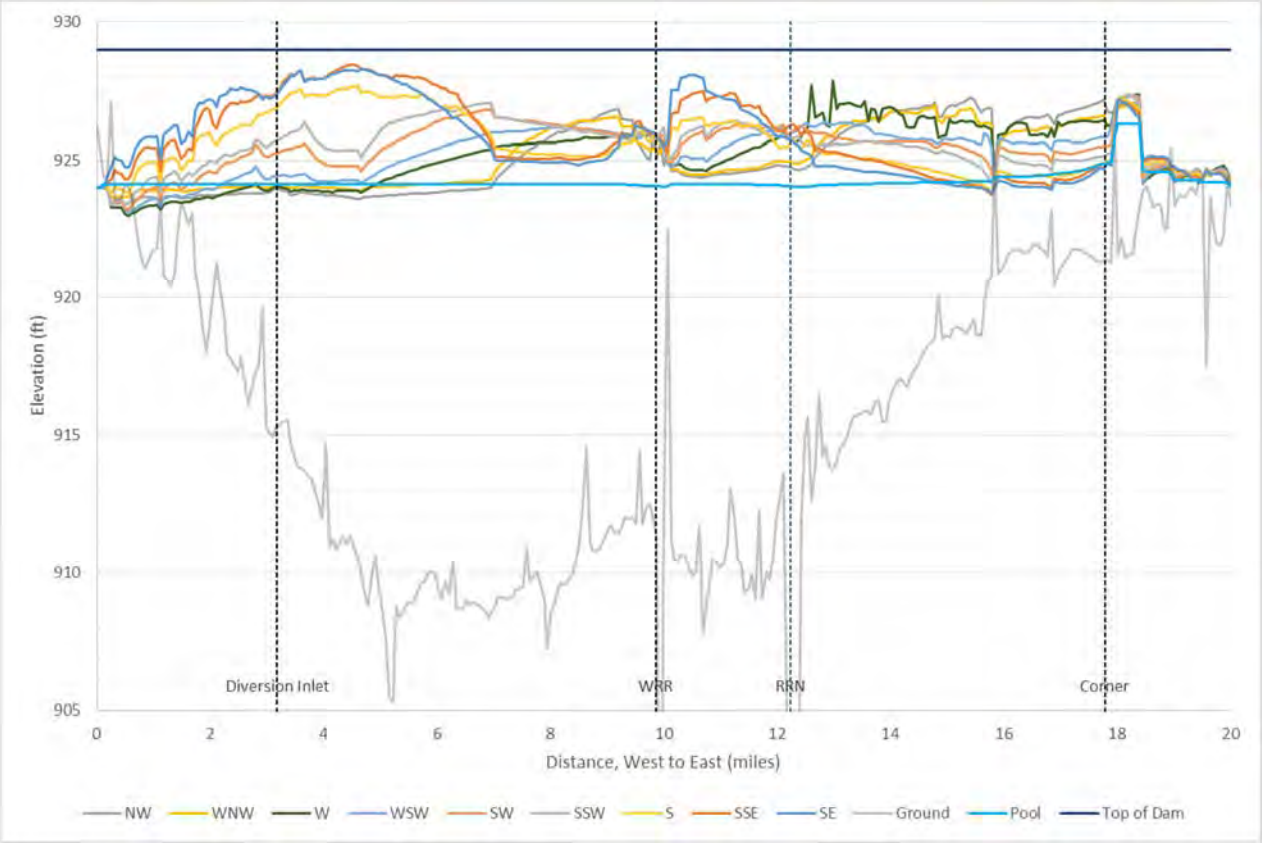

Figure C-7: Summary of Required Height to limit Wave Overtopping for 50 mph winds (elev., ft NAVD88)

The two most concerning wind directions are the SE and NW directions for various reasons. Firstly, as shown in the wind rose in Figure C-8, the most dominant wind directions for the fastest 2-minute winds in the Fargo-Moorhead area are from these two directions.

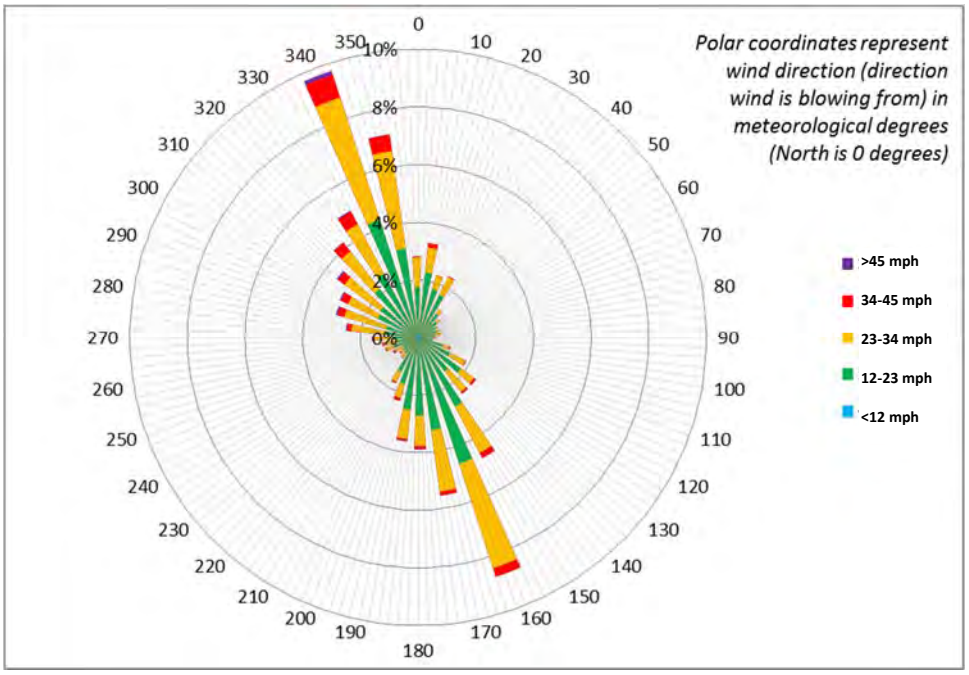

Figure C-7: Wind Rose for 2-minute daily wind data in Fargo, ND

Secondly, the SE and NW directions are the most concerning based on the wind-wave modeling results. The SE direction has the longest wind fetch lengths of any of the directions modeled due to the generally longer north-south inundation than east-west inundation and the additional length of embankment that extends north of the three structures. The required top of dam elevation is highest at this north extension area, however, does not exceed 5 feet between the pool level and top of dam for 50 mph wind conditions as shown in Figure C-8.

The NW wind direction is critical in that the sloping water surface elevation of the pool leaves portions of the most upstream extent of the Southern Embankment with less than 5 feet between the pool level and the top of dam and NW winds create the longest fetch length for the areas with higher water surface elevations. However, using the wave overtopping criteria, the 50 mph winds from the NW do not require the top of dam to exceed elevation 929.0 feet, as shown in Figure C-9.

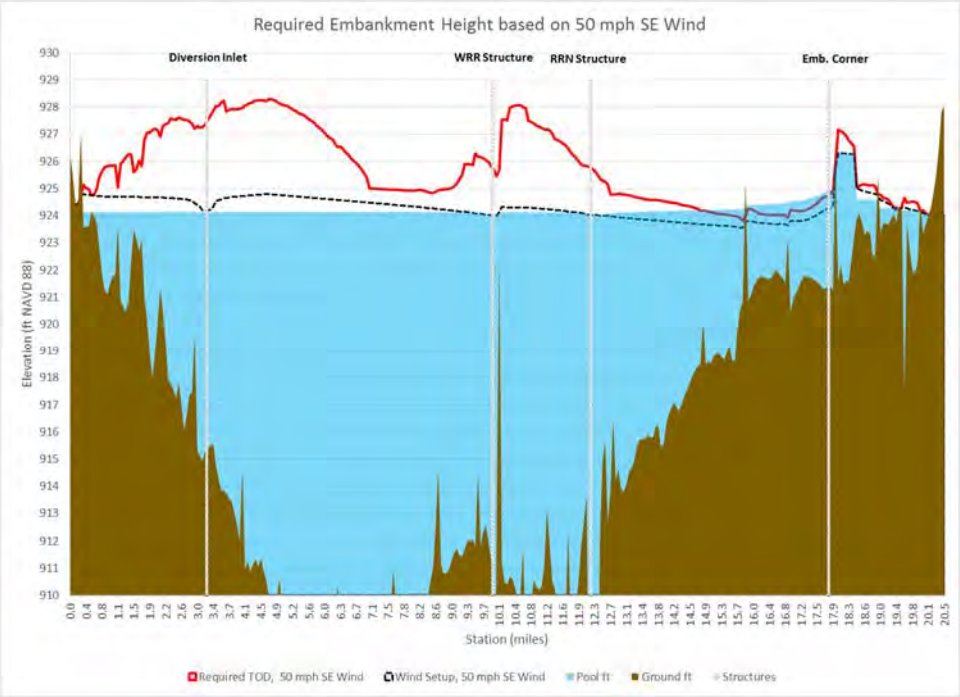

Figure C-8: Required top of dam height for SE 50 mph wind conditions based on wave overtopping

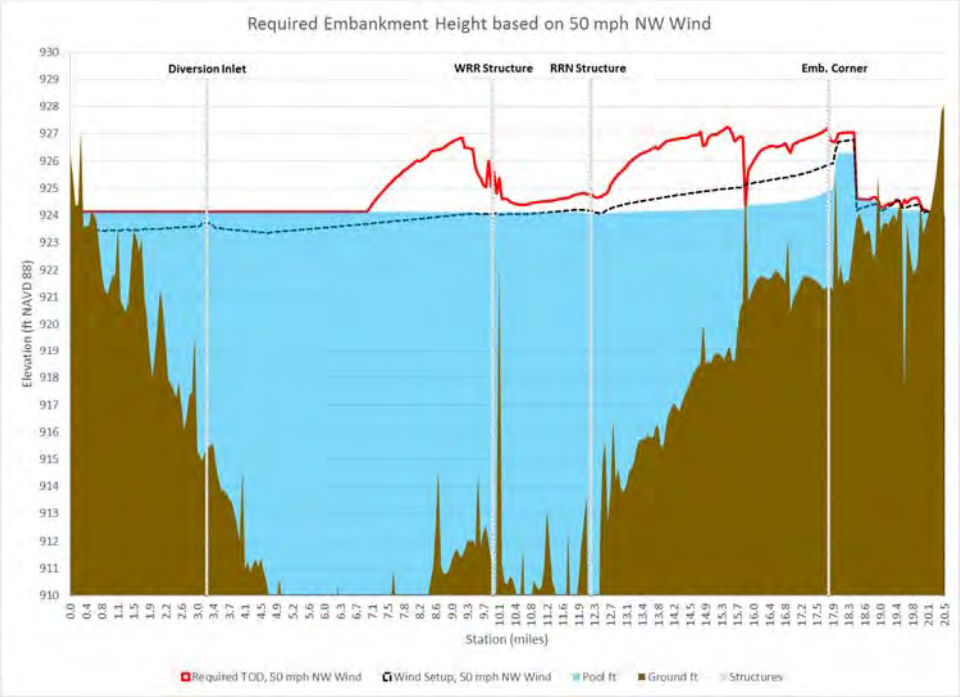

Figure C-9: Required top of dam height for NW 50 mph wind conditions based on wave overtopping

A more traditional approach to determining the required top of dam elevation above the pool level is to consider the 2% wave runup value. As discussed in the overview section of this analysis, the 2% runup is "arbitrary" and some amount of wave overtopping is allowable. The wave runup approach was considered, however, as a comparison to the wave overtopping calculation, using the following equation:

Wave runup equation:

$$\frac{R_{ui\%}}{H_s} = (A\xi + C)\gamma_r\gamma_b\gamma_h\gamma_\beta \qquad \text{(VI-5-3)}$$

where

$R_{ui\%}$ = runup level exceeded by i percent of the incident waves

ξ = surf-similarity parameter, ξ_{om} or ξ_{op}

A, C = coefficients dependent on ξ and i but related to the reference case of a smooth, straight impermeable slope, long-crested head-on waves and Rayleigh-distributed wave heights

γ_r = reduction factor for influence of surface roughness ($\gamma_r = 1$ for smooth slopes)

γ_b = reduction factor for influence of a berm ($\gamma_b = 1$ for non-bermed profiles)

γ_h = reduction factor for influence of shallow-water conditions where the wave height distribution deviates from the Rayleigh distribution ($\gamma_h = 1$ for Rayleigh distributed waves)

γ_β = factor for influence of angle of incidence β of the waves ($\gamma_\beta = 1$ for head-on long-crested waves, i.e., $\beta = 0°$). The influence of directional spreading in short-crested waves is included in γ_β as well

Similar to the wave overtopping approach, the only reduction factor included was for the angle of incidence of the waves. Coefficients A & C are based on values for the i = 2%. Using this approach, some areas in the northern most portion of the embankment require that the top of dam height above the pool to exceed 5 feet. However, this is only the case for southeasterly wind directions of 50 mph or greater. The 40 mph SE winds do not result in wave runup plus wind setup values greater than 5 feet and, as mentioned previously, allowable wave overtopping rates do not result in a requirement of greater than 5 feet for 40 or 50 mph southeasterly winds. Figure C-10 shows the results for SE winds of both 40 and 50 mph, using both approaches to estimating the required top of dam elevation.

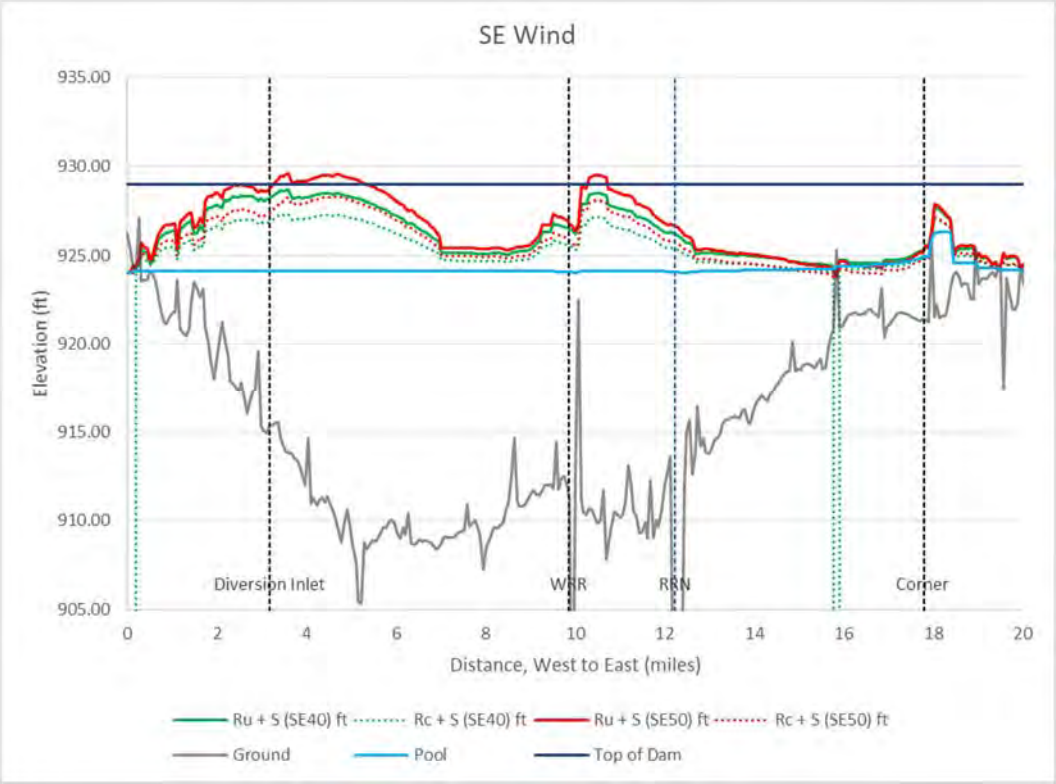

Figure C-10: Required top of dam height for SE winds, for 40 & 50 mph, using both the allowable wave overtopping approach (Rc + S) and the more conservative wave runup approach (Ru + S)

These areas that are exceeded by the traditional wave runup calculation, the northern most extension and the area between the Wild Rice and Red River structures, should be the highest area of concern for considering alternative measures to mitigate the risk of floodside erosion from waves, however, the entire Southern Embankment alignment should have reasonable assurance that "failure of the dam will not result from wind set-up" or "wave action" with a top elevation of 929.0 feet and a maximum pool of 924.0 feet.

See supporting file "FMM_WindWave_Results_20180405.xlsm" for the required top of dam elevation estimates based on the allowable wave overtopping approach and the 2% wave runup approach.

C.3.4 Wind Frequency and Coincident Probability

The maximum pool of 924.0 feet is estimated to represent an event with a frequency of 5E-4 (1/2000) ACE. The estimated duration that the pool would be within 3 feet of the maximum level for that event is 4 days. The chance of a wind event occurring resulting in severe wave runup heights or wave overtopping rates is estimated to be remote, as shown in the following simplified probability calculation for an upper bound estimate:

Probability	Value	Description
p(40 mph wind)	~0.5	annual chance exceedance that 40 mph wind occurs
p(924 ft pool)	0.0005	annual chance exceedance that 924.0 foot pool occurs
Correlation	1	upper bound correlation between wind and pool
p(40 mph|4 days)	(1 - 0.5^4)	chance that at least one day has winds exceeding 0.5 ACE
	0.9375	
Joint Probability	0.00047	p(924 ft pool)* p(40 mph|4 days)*correlation
Return Period	2,133	Expected recurrence interval, in years

This is considered an upper bound estimate to the probability of the 0.5 ACE wind occurring coincident with the 1/2000 ACE pool because the correlation value is set to the maximum value of 1. This assumes that the wind frequency estimate is precisely calculated for the four day period of concern and for the wind fetch direction of concern. In reality, the wind frequency estimate reflects all-season and all-directional wind speeds. The joint probability of this wind & pool event would likely be reduced further by either refining the correlation value or refining the wind speed frequency by seasonality or direction. Ultimately, however, this upper bound estimate is sufficient as it is meant to demonstrate the likelihood of the 40 mph wind event where wave runup and wave overtopping are not at concerning levels. The next calculation shows the same approach for a more infrequent wind of 50 mph:

Probability	Value	Description
p(50 mph wind)	~0.01	annual chance exceedance that 50 mph wind occurs
p(924 ft pool)	0.0005	annual chance exceedance that 924.0 foot pool occurs
Correlation	1	upper bound correlation between wind and pool
p(50 mph|4 days)	(1 - (1 - 0.01)^4)	chance that at least one day has winds exceeding 0.01 ACE
	0.0394	
Joint Probability	1.97E-05	p(924 ft pool)* p(50 mph|4 days)*correlation
Return Period	50,756	Expected recurrence interval, in years

The 50 mph wind speed does not result in concerning wave overtopping rates but does highlight some portions of the embankment that exceed the 5 feet required for a traditional wave runup analysis. This coincident probability calculation is meant to demonstrate the remote probability that wave conditions result in wave runup values higher than the crest but wave overtopping rates below tolerable levels. Assuming this more infrequent wind condition results in a joint probability less frequent than 1/50,000 ACE. This is still considered an upper bound because the correlation is assumed to be 1; it is simply a matter of the low likelihood that a 4 day period would result in an exposure to a 0.01 ACE wind.

C.4 CONCLUSIONS

A top of dam height that limits wave overtopping to 0.01 cfs/ft would, according to guidance from the Coastal Engineering Manual limit the backside flows to the "Start of Damage" for 'Grass Sea-Dikes'. Due to the non-erosive nature of the cohesive clay embankment material and the anticipated well-maintained vegetation for the project, significant erosion would not be associated with overtopping rates of 0.01 cfs/ft. Figure C-11 shows the critical overtopping rate estimates associated with various levels of damage for different types of structures.

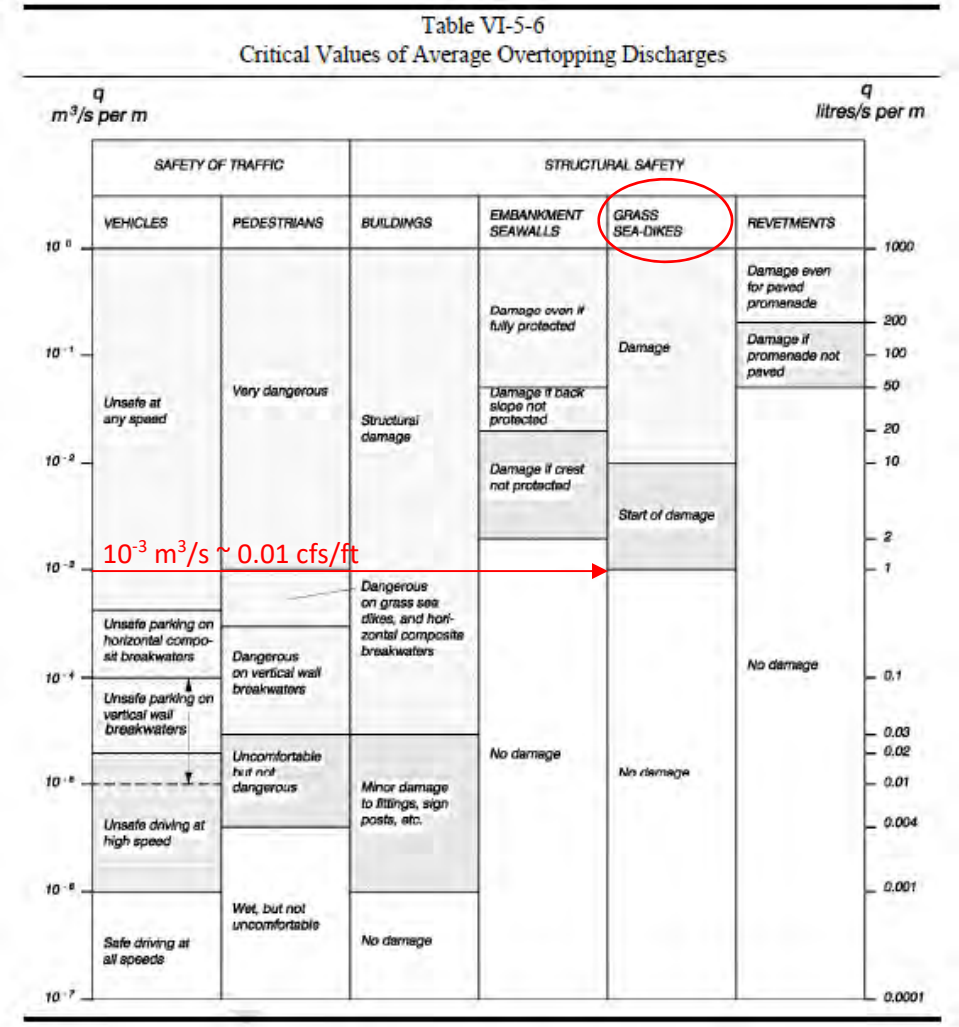

Figure C-11: Critical Values of Average Overtopping Discharges from the Coastal Engineering Manual.

Due to the remote probability (1/50,000 ACE) of a 50 mph 1-hour sustained wind occurring coincidentally with the 1/2000 ACE pool level and the fact that this remote event still results in wave overtopping rates below critical levels where damage may be expected to start, it is recommended that the top of dam elevation be constructed at 5 feet above the maximum pool level of 924.0 feet.

C.5 REFERENCES

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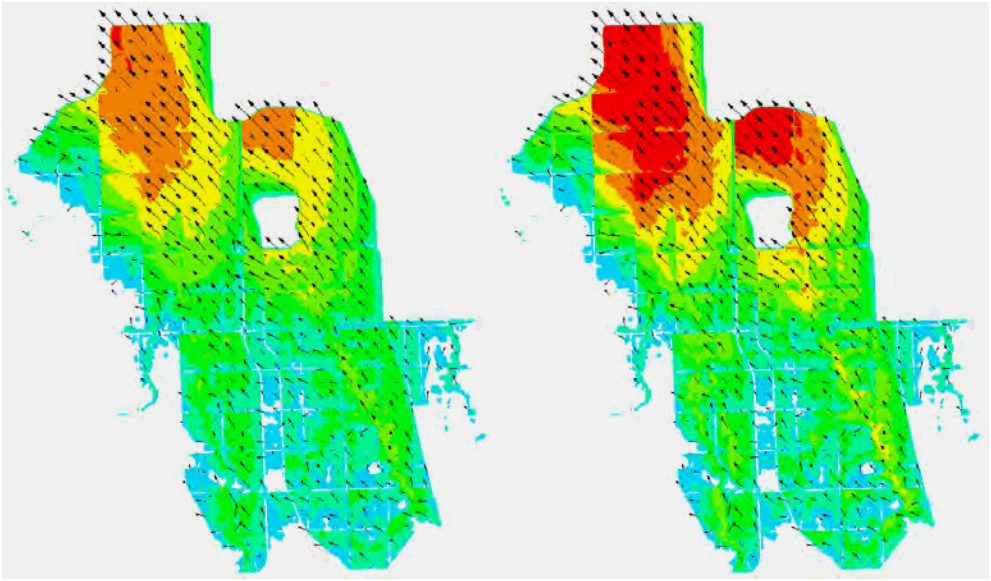
APPENDIX 1: WAVE HEIGHT



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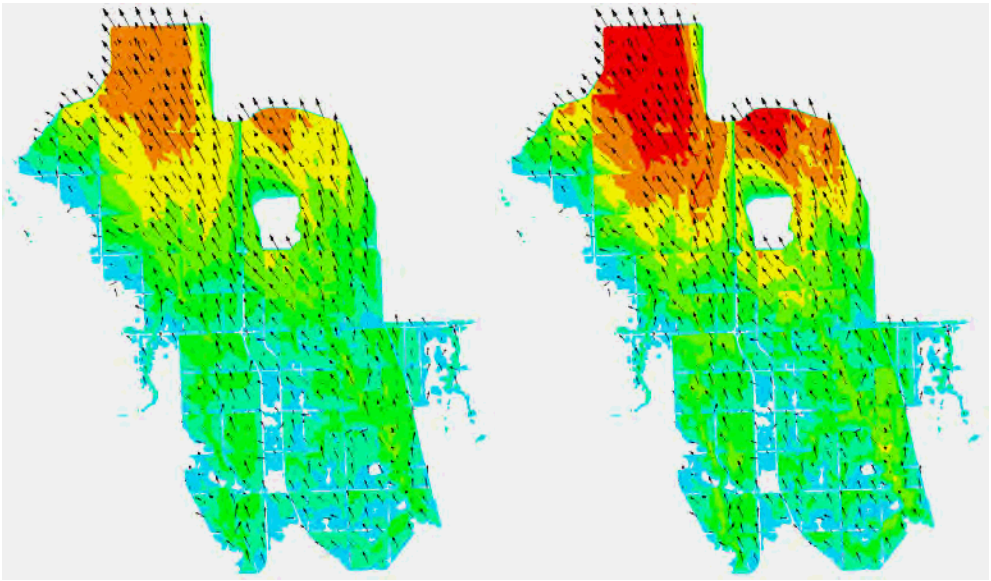

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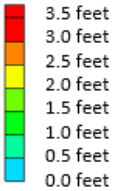

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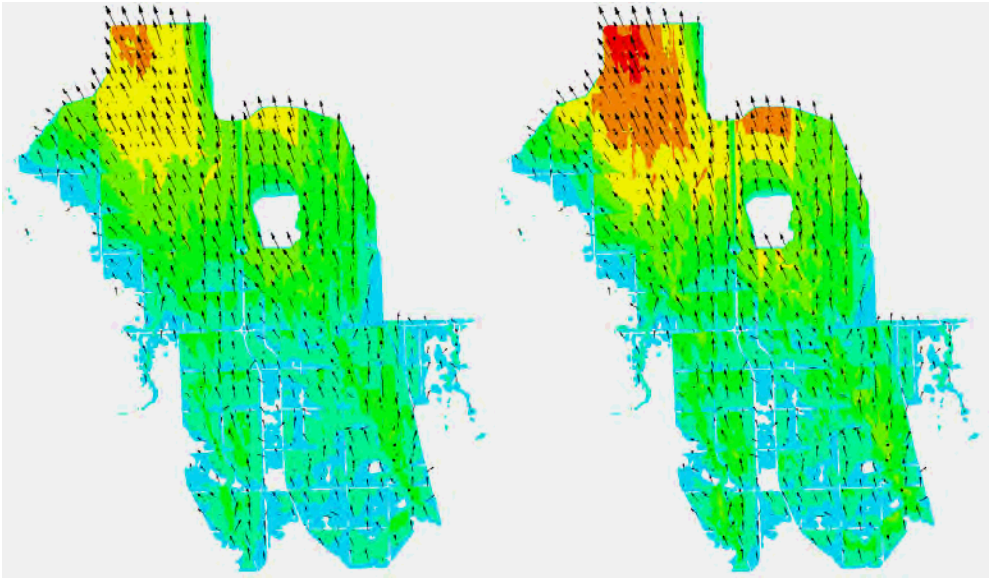

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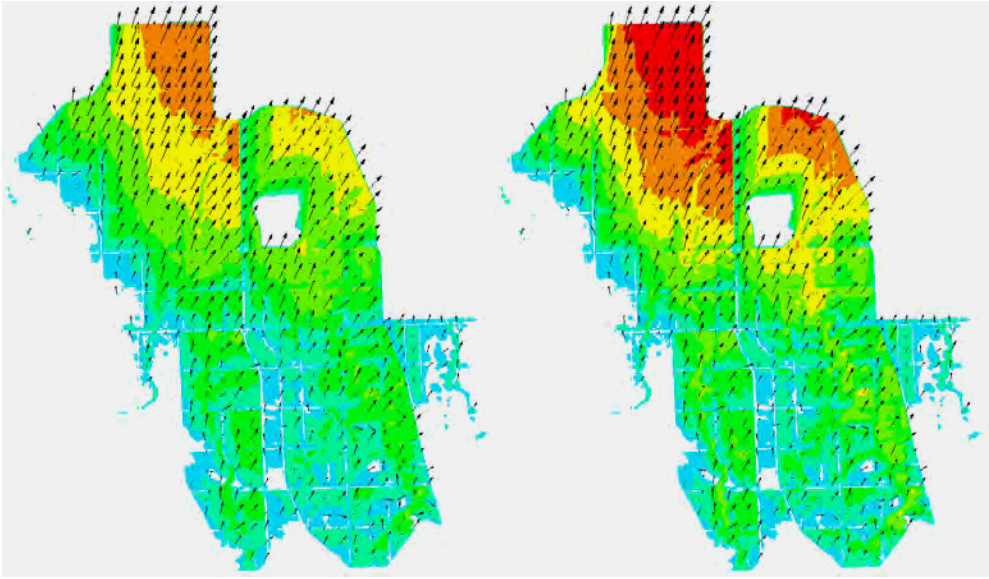

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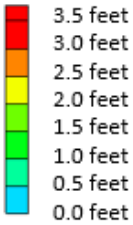

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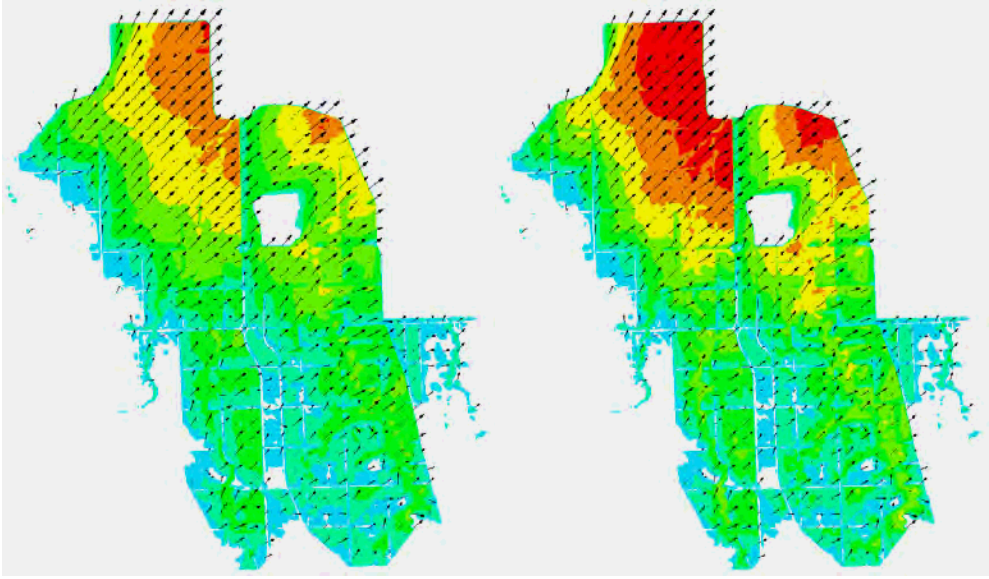

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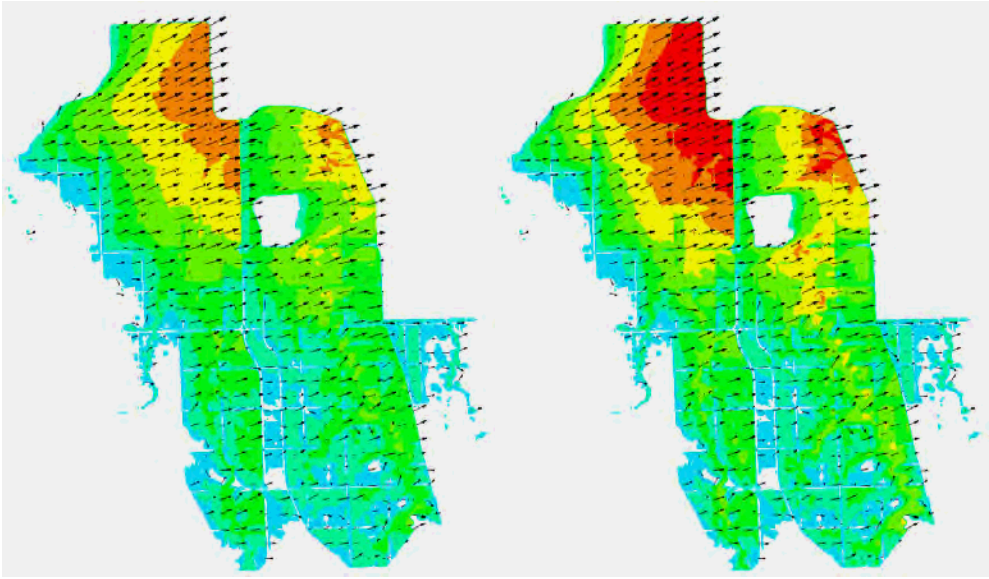

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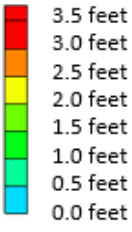

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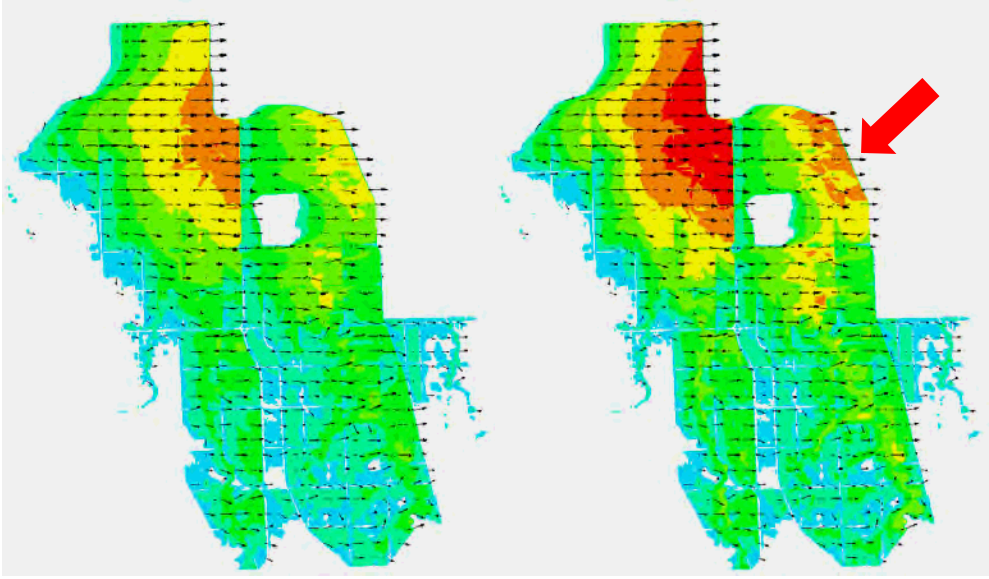

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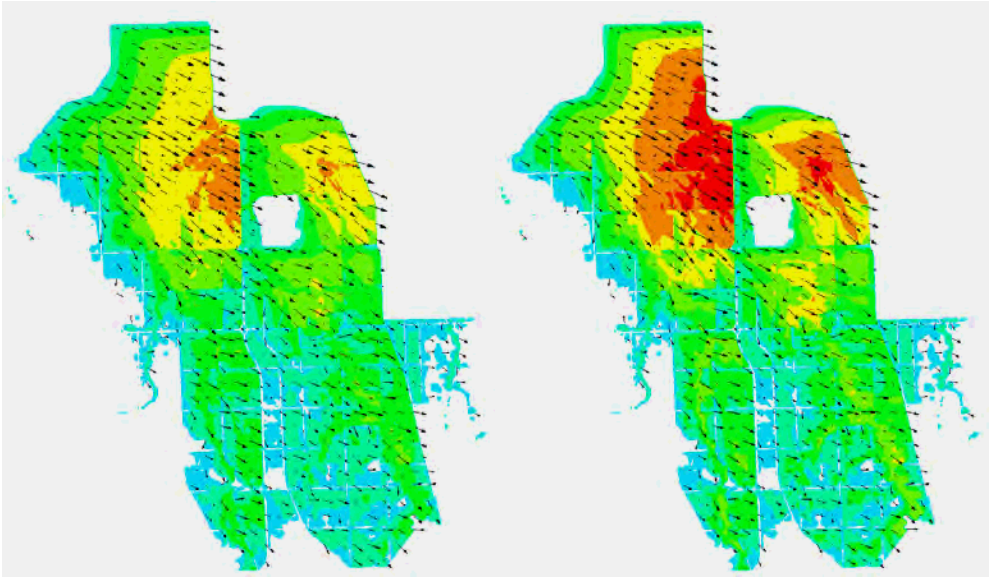

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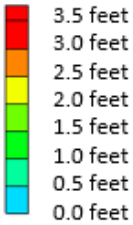

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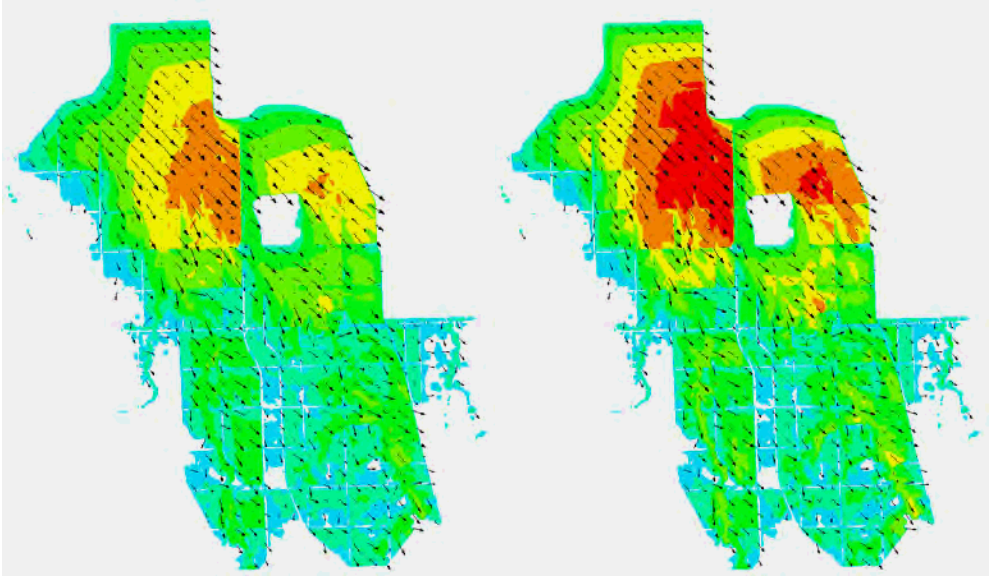

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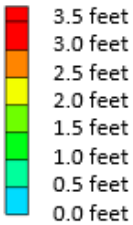

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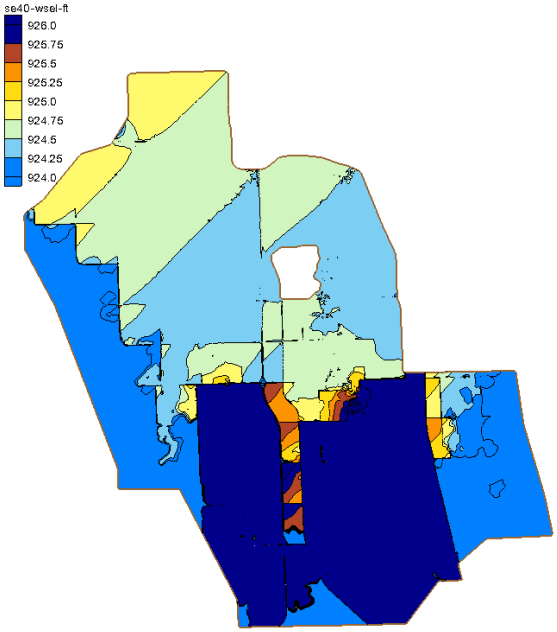

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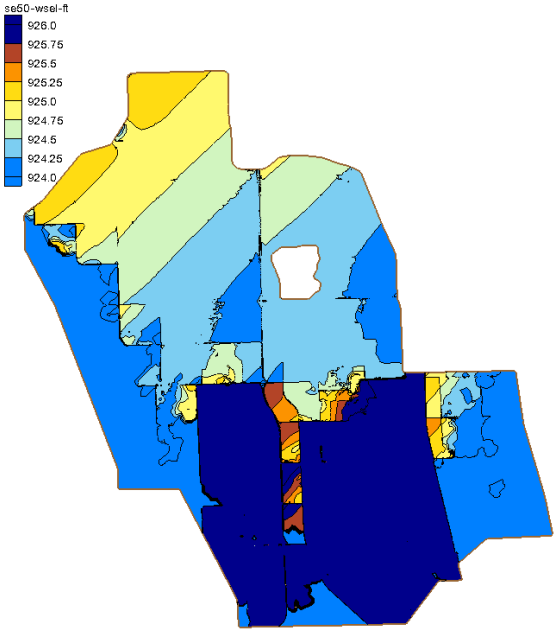

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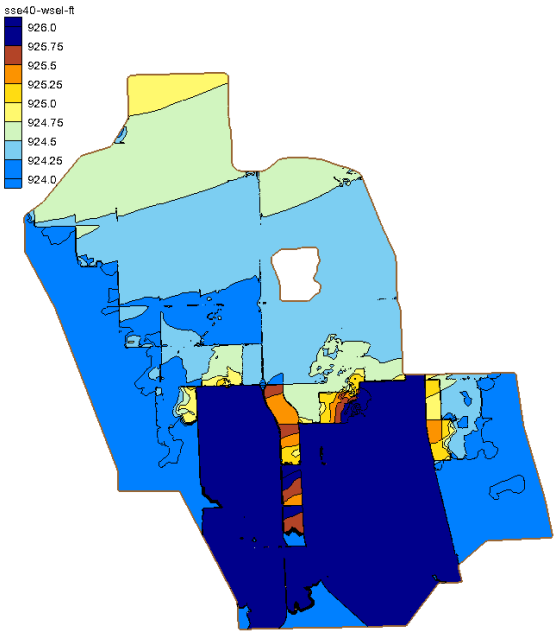

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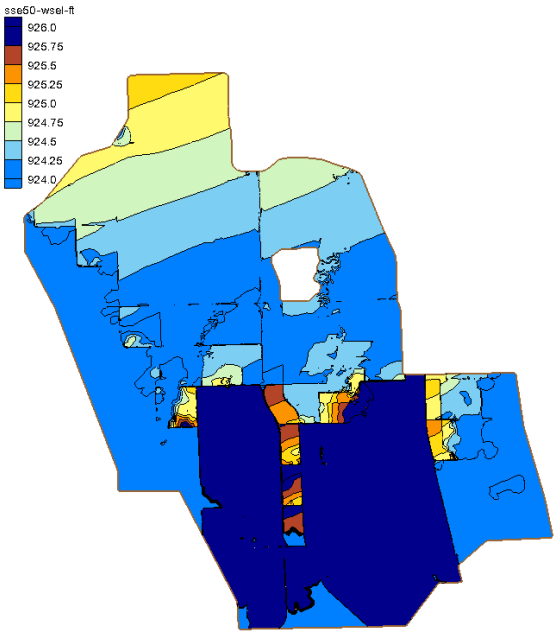

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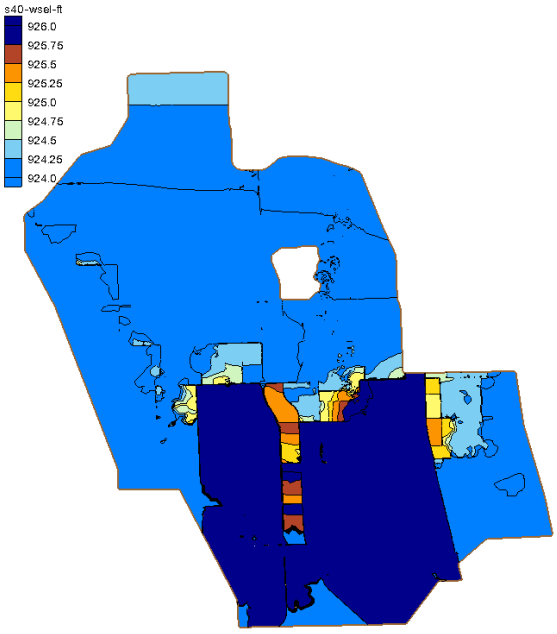

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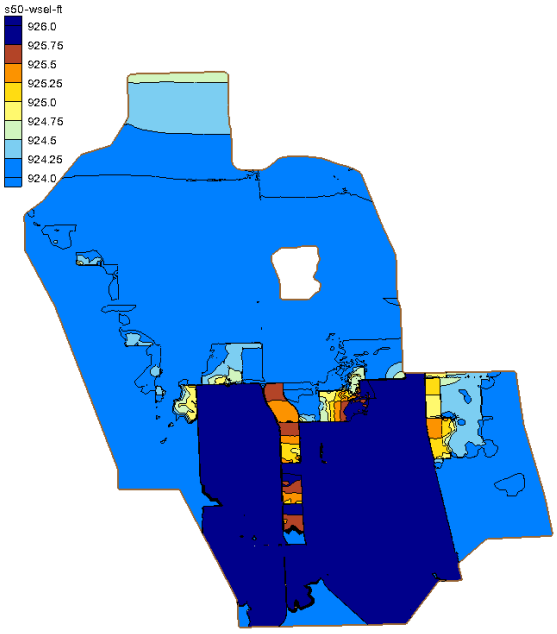

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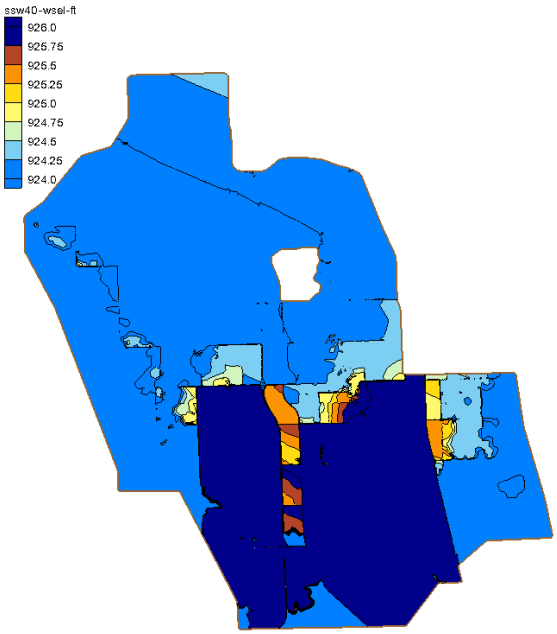

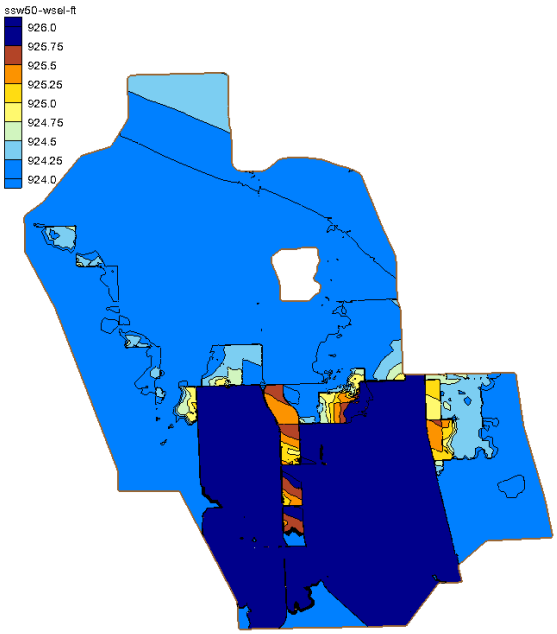

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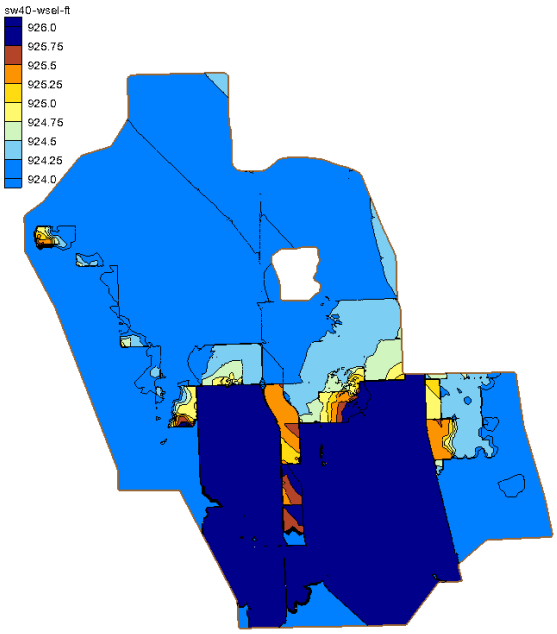

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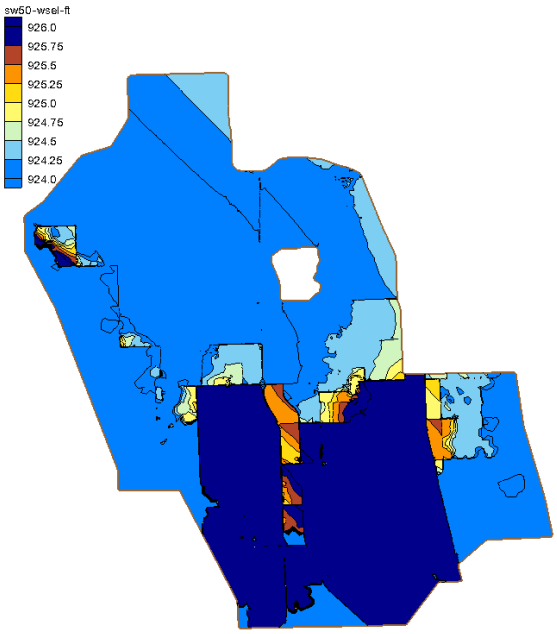

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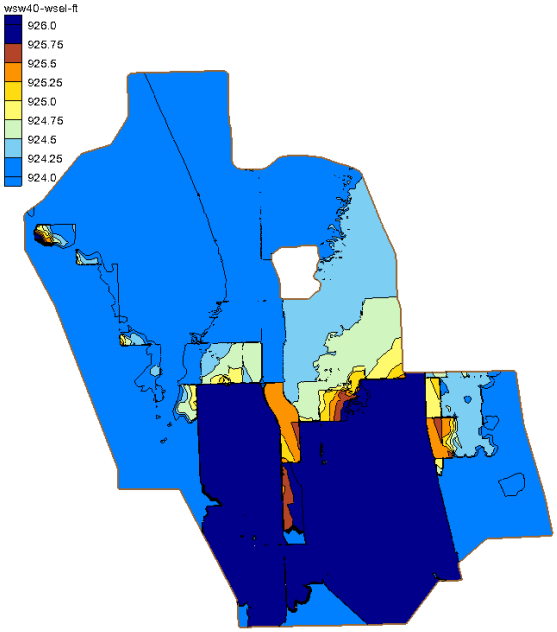

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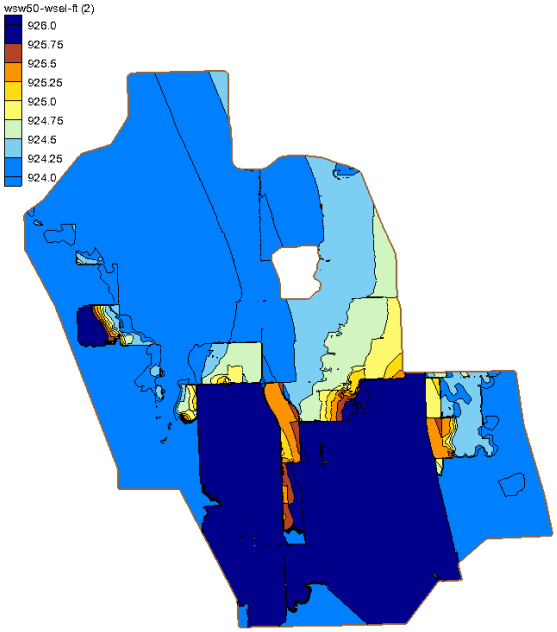

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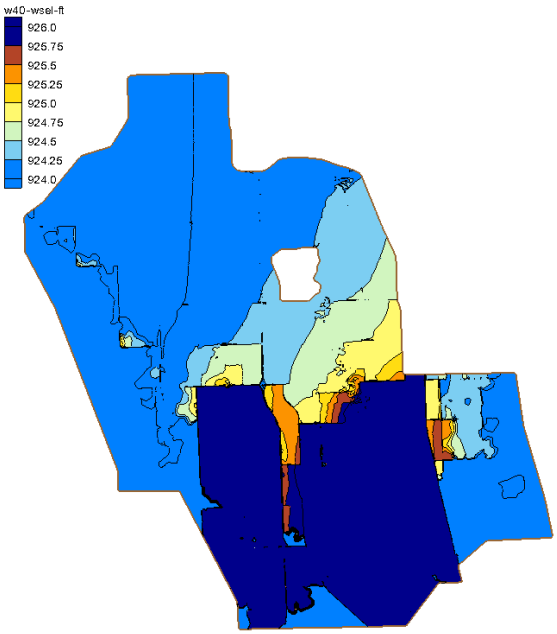

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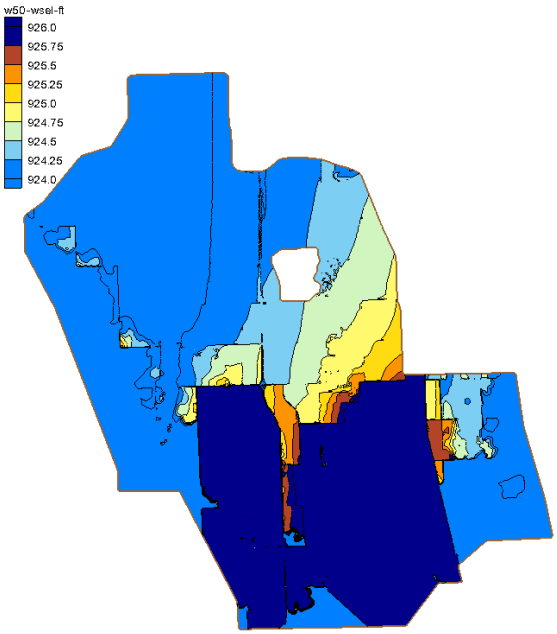

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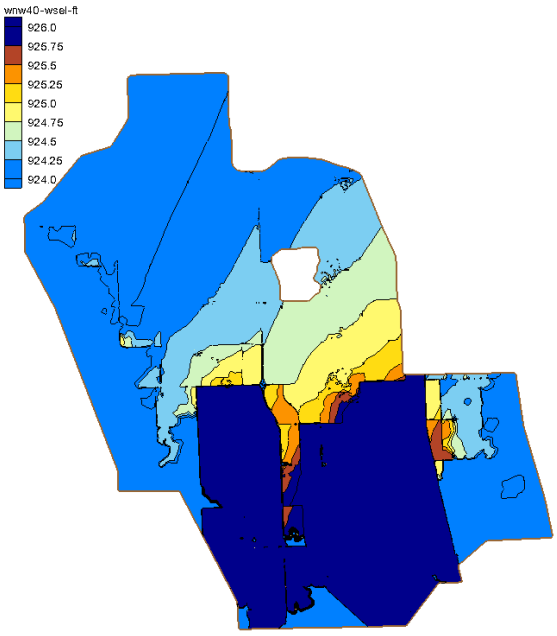

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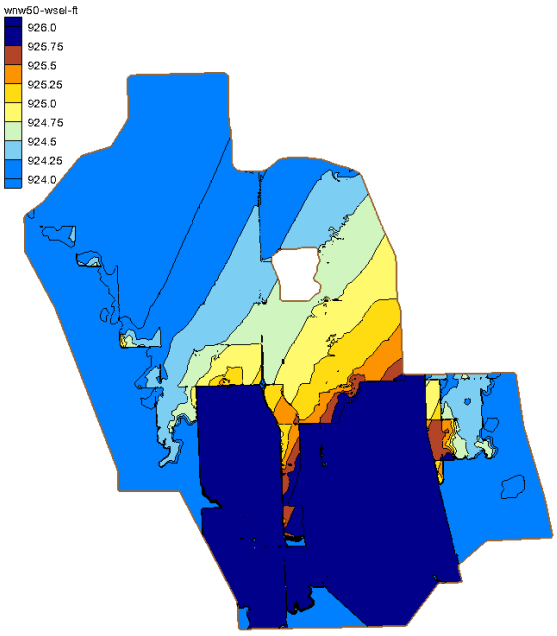

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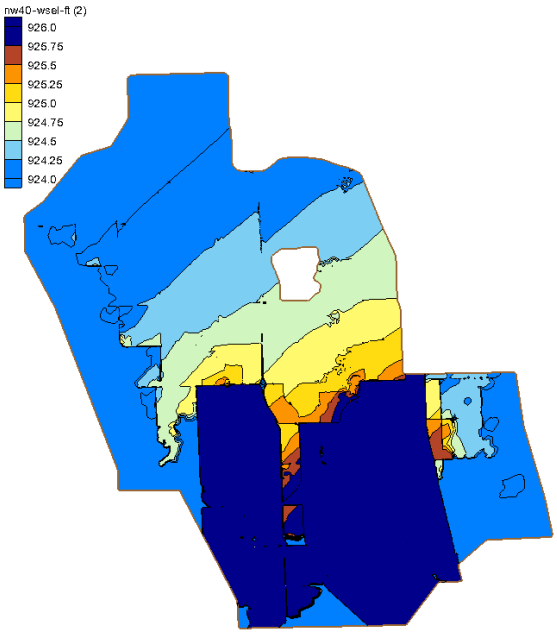

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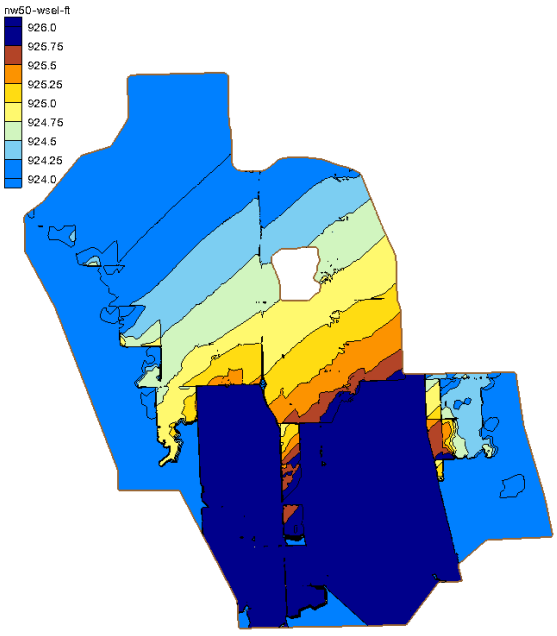

NW50

Attachment 3

DRAFT

Fargo Moorhead Red River Diversion Operation Plan

1. Background

1.1. The Project

- The Project includes a 30 mile long diversion channel that diverts floodwaters around the Fargo-Moorhead Metro Area, which includes: Fargo, North Dakota; Moorhead, Minnesota; and surrounding communities in Cass County, North Dakota and Clay County, Minnesota.
- Since the diversion channel provides additional hydraulic conveyance around the communities, a temporary retention area is needed to mitigate the increases in discharge caused by the diversion channel. The proposed retention area, referred to as the Staging Area, is located at the upstream end of the diversion.
- The area within the diversion that will benefit from the flood mitigation is referred to as the Flood Damage Reduction Area (FDRA).

1.2. Operation Plan Concepts

- The diversion channel diverts flood waters from the Red River of the North (RRN) and five tributaries; Wild Rice River (WRR), Sheyenne River, Maple River, Rush River, and Lower Rush River.
- Without the Staging Area, the diversion channel would increase downstream water surface elevations (as compared to existing no-project conditions).
- The Red River and Wild Rice River are directly regulated by gated control structures that will be constructed on both rivers.
- The Rush and Lower Rush Rivers will intersect and flow directly into the diversion channel.
- Flows from the Sheyenne and Maple Rivers are divided at the Aqueducts where low flows pass over the diversion and into the FDRA through a concrete channel, and flows in excess of this capacity pass over a weir and into the diversion channel. Meanwhile, the diversion flows pass under the tributaries through box culverts.
- Any conveyance that differs from existing conditions will have impacts on the water surface elevation of the Red River, downstream of the project. Since much of the tributary flows pass directly into the diversion channel, the Staging Area must be used to offset the impacts.
- The dynamics of the Staging Area are controlled by the storage volume within the Staging Area, the magnitudes and temporal variations of the upstream inflows and the gate operating rules.
- Gated control structures are located on the Red River (Red River Control Structure - RRCS), on the Wild Rice River (Wild Rice River Control Structure -WRRCS), and at the upstream end of the diversion channel (Diversion Inlet Control Structure - DICS).
- The flood mitigation approach utilized in this study is unique in that a targeted downstream flow condition is determined by the magnitudes and temporal variations of the flows from the six rivers and the gate operating rules. However, regulation can only occur on hydrology delivered by the Red River and Wild Rice River because the other tributary flows cannot be regulated.

1.3. Power law relationships in hydrology

Recent studies have shown that the storage-discharge relationship can be characterized by a general power law function, $Q=aV^b$ (Wittenberg, 1994; Wittenberg and Sivapalan, 1999; Harman and Sivapalan, 2009). The power law relationship application has also been proven through field evidence and physical experiments (Mein et al., 1974, Wittenberg, 1994; Chapman, 1999).

Storage-discharge relationships have been widely used in many hydrology fields:

- Flood estimation (Mein et al., 1974; Georgakakos et al., 1982; Zhang et al., 2000; Rahman and Goonetilleke, 2001; Rezaei-Sadr et al., 2012)
- Rainfall-runoff simulation (Horton, 1938; Dooge, 1973; Nash, 1958; Wang and Gupta, 1981; Hughes and Murrell, 1986; Basha, 2000; Nourani et al., 2009)
- Groundwater flow (Vogel and Kroll, 1992)
- Base flow recession (Cheng, 2008; Aksoy and Wittenberg, 2011; Wang, 2011; Gan and Luo, 2013), and
- Sewer water flow (Gernaey et al., 2011).

1.4. Storage-discharge relationships for optimal flood release

- The power law relationship was introduced in this study to calculate the optimal discharge releases from the Staging Area.
- The calculated releases were derived from the available flow to be sent to the downstream reaches from the Staging Area.
- The coefficients of the power law relationships were determined by testing the equations with numerous synthetic and historic simulations and fitting the operated hydrographs to the existing condition hydrographs at a location downstream of the diversion outlet.
- The power law relationships that were developed for the operations plan utilize the physical storage characteristics within the staging area as inflows arrive from the WRR and RRN. The relationships also take into account the mitigation requirements from the WRR, RRN, and all tributary inflows to the diversion channel.

The normal operation plan is expected to apply 99.8% of the time. However, 0.2% of the time, a National Weather Service (NWS) flood forecast will be required to determine if extreme event operation shall take place. Flowchart A shows the general guidelines of project operation for varying flood magnitudes:

- Normal Operation (99.8% of the time, 500-year flood event and smaller)
- Inflow Design Flood (IDF) Operation (greater than 500-year flood event through IDF)
- Probable Maximum Flood (PMF) Operation (greater than IDF).

The operation rules provide iterative step-by-step procedures to operate the gates after reading various gages for flow and stage from the rising limb through the falling limb of the flood hydrograph. The procedures are well defined and should not require subjective human decision making during operation. However, it is expected that calculations will be made periodically throughout operation to verify adequacy of the automated operation. The operation will differ if a flood prediction exceeds a 500-year event, at which point the project objective transitions from mitigating downstream impacts to protecting

the project infrastructure. Currently, this transition is incorporated into the HEC-RAS rules using an index function based on upstream flows.

For a flood that is less than or equal to a 500-year event, the project operation follows the detailed operation rules as demonstrated in Flowchart B and described in Section 2. For a flood that is 500-year event through the IDF or greater than the IDF, the control structure gates are either partially operated or not operated as defined in Sections 3 and 4 and Flowchart A.

2. Operation Plan for 500-Year Flood Event and Smaller

The real-time gate operation for a flood less than or equal to a 500-year event is generally guided through six Operation Segments followed in sequence as described below and in Flowcharts B and C:

- Operation Segment 1 - No Operation
- Operation Segment 2 - Gate Preparation
- Operation Segment 3 - Hold
- Operation Segment 4 - Rising
- Operation Segment 5 - Transition
- Operation Segment 6 – Falling

Each of the Operation Segments is specially designed based on the flood characteristics to:

(1) hold and store water, and mitigate the downstream impacts on the rising limb of the hydrograph,
(2) efficiently release water from the Staging Area to minimize the effects on the Staging Area and downstream water level changes.

Throughout the operation process, the corresponding allowable flow, and gate openings for the WRRCS, RRCS, and DICS are calculated for each operation iteration.

2.1 **Operation Segment 1 – No Operation**

On the rising limb of the hydrograph, when the combined flow at Enloe, Red River and Abercrombie, Wild Rice River is less than a 10 year flood, the project will not operate.

2.1.1 Record flows from USGS gages:

- 05053000, Wild Rice River at Abercrombie, Q^t_{ABER}
- 0505152130, Red River at Enloe, Q^t_{ENLOE}

Where t = Number of the project operation iteration since operation began (e.g., 1, 2, 3. etc.)

2.1.2 Sum current flows at Abercrombie and Enloe, Q^t_{AE}

$$Q^t_{ABER} + Q^t_{ENLOE} = Q^t_{AE}$$

2.1.3 Compare the combined flow at Abercrombie and Enloe, Q^t_{AE} with 17,000 cfs.

- If the combined flow at Abercrombie and Enloe, Q^t_{AE}, is less than 17,000 cfs, continue with Operation Procedure 2.1.4.
- If the combined flow at Abercrombie and Enloe, Q^t_{AE}, becomes greater than 17,000 cfs, move to "Operation Segment 2 - Gate Preparation".

2.1.4 If the combined flow at Abercrombie and Enloe, Q^t_{AE}, is less than 17,000 cfs, WRRCS and RRCS gates are completely open, and DICS gates are closed.

2.1.5 Continue the iteration and repeat the procedures in "Operation Segment 1 - No Operation".

2.2 Operation Segment 2 – Gate Preparation

Operation Segment 2 is a single-iteration process to set the initial gate openings for RRCS and WRRCS and calculate the initial flow to hold through town.

2.2.1 Record water surface elevations in the Staging Area

- Wild Rice River, $Z^t_{STAGING\_AREA\_WRR}$
- Red River, $Z^t_{STAGING\_AREA\_RR}$

The Staging Area is large enough that the water surface elevation may vary from one side to another. Therefore, the water surface elevations are measured at both the Wild Rice River (XS64862, DR37 to DIV) and Red River (XS2531315, Breck to Wolv) and the difference in the elevations is used to account for the proportion of water arriving from the two upstream sources.

2.2.2 Compute the flow through WRRCS and RRCS corresponding to the staging area water surface elevations using Tables 1 and 2

- Record the flow at WRRCS, Q_{WRRCS_HOLD}

$$Q_{WRRCS\_HOLD} = Table\ 1\ (Z^t_{STAGING\_AREA\_WRR}) \qquad when\ Q^t_{AE} = 17{,}000\ cfs$$

- Record the flow at RRCS, Q_{RRCS_HOLD}

$$Q_{RRCS\_HOLD} = Table\ 2\ (Z^t_{STAGING\_AREA\_RR}) \qquad when\ Q^t_{AE} = 17{,}000\ cfs$$

2.2.3 Compute the total flow to hold through town, $Q^{t0}{}_{HOLD}$, which will be used in "Operation Segment 3 - Hold"

$$Q^{t0}_{HOLD} = Q^{t0}_{WRRCS\_HOLD} + Q^{t0}_{RRCS\_HOLD} \qquad when\ Q^t_{AE} = 17{,}000\ cfs$$

2.2.4 Prepare the WRRCS and RRCS gates by setting their gate openings using the following equations:

- Gate opening at Wild Rice River Control Structure

$$H^t_{WRRCS} = Z^t_{STAGING\_AREA\_WRRCS} - 889.55_{GATE\_INVERT}$$

- Gate opening at Red River Control Structure

$$H^t_{RRCS} = Z^t_{STAGING\_AREA\_RRCS} - 874.00_{GATE\_INVERT}$$

2.2.5 Continue to "Operation Segment 3 - Hold".

2.3 Operation Segment 3 - Hold

In Operation Segment 3, the gate openings for WRRCS and RRCS are controlled to maintain a specified flow through town. At this point, the Staging Area water surface elevation will begin to rise.

2.3.1 Record flows from USGS gages:

- 05053000, Wild Rice River at Abercrombie, Q^t_{ABER}
- 0505152130, Red River at Enloe, Q^t_{ENLOE}
- xxxxxxxxx, Maple River at Durbin, $Q^{t-36/\Delta t}_{MAPLE}$ (flow at gage 36 hours ago)
- 05058980, Sheyenne River at Gol Road, $Q^{t-36/\Delta t}_{SHEY}$ (flow at gage 36 hours ago)
- 05060500, Rush River at Amenia, $Q^{t-36/\Delta t}_{RUSH}$ (flow at gage 36 hours ago)

Where Δt = Number of hours per operation iteration, and $-36/\Delta t$ = the number of iterations looking back to obtain the flow at tributary gages, i.e., flow at 36 hours ago, and $t-36/\Delta t$ = the number of operation iteration since operation began to obtain the flow at tributary gages.

2.3.2 Record water surface elevations in the Staging Area

- Wild Rice River, $Z^t_{STAGING\_AREA\_WRR}$
- Red River, $Z^t_{STAGING\_AREA\_RR}$

2.3.3 Sum current flows at Abercrombie and Enloe, Q^t_{AE}

$$Q^t_{ABER} + Q^t_{ENLOE} = Q^t_{AE}$$

2.3.4 Calculate the flow proportion ratios for WRRCS and RRCS, R^t_{WRRCS} and R^t_{RRCS}

Record the maximum water surface elevation in the Staging Area at Wild Rice River and Red River up to time t, Z^t_{max}. If the Staging Area maximum water surface elevation is lower than 914, the ratio between the WRRCS and RRCS is calculated as the percentage of flow contribution from Wild Rice River and Red River to the Staging Area. If the maximum water surface elevation is higher than 914, the proportion ratios are calculated based on a stage difference-driven approach.

$$Z^t_{\max} = \max(Z^t_{STAGING\_AREA\_RR}, Z^t_{STAGING\_AREA\_WRR})$$

$$R^t_{RRCS} = \begin{cases} Q^t_{ENLOE} / Q^t_{AE} & Z^t_{\max} \le 914 \\ \dfrac{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \text{ and } Z^t_{\max} > 914 \\ \dfrac{0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases}$$

$$R^t_{WRRCS} = \begin{cases} Q^t_{ABER} / Q^t_{AE} & Z^t_{\max} \le 914 \\ \dfrac{0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \text{ and } Z^t_{\max} > 914 \\ \dfrac{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases}$$

2.3.5 Record the maximum combined Abercrombie and Enloe flow up to time t

$$Q^t_{AE\_MAX} = Max(Q^t_{AE})$$

2.3.6 Compute flow reduction for tributary rivers

- Sheyenne River

$$Q^t{}_{SHEY\_REDUC} = \begin{cases} 0 & when \quad Q^{t-36/\Delta t}_{SHEY} \le 2{,}000\ cfs \\ Q^{t-36/\Delta t}_{SHEY} - 2{,}000 & when \quad 2{,}000 \le Q^{t-36/\Delta t}_{SHEY} \le 4{,}600\ cfs \\ 0.5 \times (Q^{t-36/\Delta t}_{SHEY} - 4{,}600) + 2{,}600 & when \quad Q^{t-36/\Delta t}_{SHEY} > 4{,}600\ cfs \end{cases}$$

- Maple River

$$Q^t{}_{MAPLE\_REDUC} = \begin{cases} 0 & when \quad Q^{t-36/\Delta t}_{MAPLE} \le 3{,}000\ cfs \\ 0.8 \times (Q^{t-36/\Delta t}_{MAPLE} - 3{,}000) & when \quad Q^{t-36/\Delta t}_{MAPLE} > 3{,}000\ cfs \end{cases}$$

- Rush River

$$Q^t{}_{RUSH\_REDUC} = Q^{t-36/\Delta t}_{RUSH}$$

2.3.7 Compute total flow reduction for tributary rivers

$$Q^t_{REDUCTION} = Q^t{}_{SHEY\_REDUC} + Q^t{}_{MAPLE\_REDUC} + Q^t{}_{RUSH\_REDUC}$$

2.3.8 Record maximum flow reduction up to time t

$$Q^t_{REDUCTION\_MAX} = Max(Q^t{}_{REDUCTION})$$

2.3.9 Compute the parameter ***a*** using Table 3, which is a function of the maximum combined Abercrombie and Enloe flow and the maximum flow reduction.

$$a = Table\ 3(Q^t_{AE\_MAX}, Q^t_{REDUCTION\_MAX})$$

2.3.10 Compute the volume of water in the Staging Area using Table 4

$$V^t_{STAGING\_AREA} = Table\ 4(Z^t_{STAGING\_AREA\_RR})$$

2.3.11 Compute the designed flow for the rising limb of the hydrograph, Q_{RISING}

$$Q^t_{\mathrm{RISING}} = a\,(V^t_{STAGING\_AREA\_RR})^{1.3} - Q^t{}_{REDUCTION}$$

where the unit for volume of water in the Staging Area, $V^t{}_{STAGING\_AREA,}$ is ac-ft and the unit for $Q^t{}_{REDUCTION}$ and $Q^t{}_{RISING}$ is cfs.

2.3.12 Calculate $Q^t{}_{HOLD}$, $Q^t{}_{WRRCS\_HOLD}$, and $Q^t{}_{RRCS\_HOLD}$. In the first iteration of segment 3, $Q^t{}_{HOLD}$, $Q^t{}_{WRRCS\_HOLD}$, and $Q^t{}_{RRCS\_HOLD}$ values shall be used as recorded from "Operation Segment 2 - Gate Preparation", and the $Q^t{}_{HOLD}$ in the subsequent operation iterations is then calculated using the following equation. A gradual decreasing $Q^t{}_{HOLD}$ is applied. A decreasing rate, 2,000cfs/day, was determined based on the historical daily maximum flow decreasing rate at Hickson and Fargo gages in consideration of bank stability.

$$Q^t_{\mathrm{HOLD}} = \begin{cases} Q^{t0}_{\mathrm{HOLD}} & \textit{First iteration} \\ Q^{t-1}_{\mathrm{HOLD}} - (2{,}000/24)\Delta t & \textit{Subsequent iterations} \end{cases}$$

where Δt = number of hours per operation iteration.

- Allowable flow to pass the WRRCS $(Q^t{}_{WRRCS})$

$$Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{HOLD}$$

- Allowable flow to pass the RRCS $(Q^t{}_{RRCS})$

$$Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{HOLD}$$

2.3.13 Compare Q_{RISING} with $Q^t{}_{HOLD}$.

- If Q_{RISING} is less than $Q^t{}_{HOLD}$, continue with the procedures in "Operation Segment 3 - Hold". Use the flow calculated from procedure 2.3.12 as the allowable flow to pass WRRCS and RRCS, with the DICS remains closed. Continue with the Operation Procedure 2.3.14.
- If Q_{RISING} is greater than $Q^t{}_{HOLD,}$ begin "Operation Segment 4 - Rising".

2.3.14 Determine the gate opening height for WRRCS and RRCS using the calculated flow from the procedure 2.3.12 and the Staging Area water surface elevations using Tables 5 & 6.

- Gate opening at Wild Rice River Control Structure

$$H^t_{WRRCS} = Table\ 5(Q^t_{WRRCS}, Z^t_{STAGING\_AREA\_WRR})$$

- Gate opening at Red River Control Structure

$$H^t_{RRCS} = Table\ 6\ (Q^t_{RRCS}, Z^t_{STAGING\_AREA\_RR})$$

2.3.15 Continue to the next iteration and repeat procedures for the gate operation in "Operation Segment 3 - Hold".

2.4 Operation Segment 4 – Rising

In Operation Segment 4, the gates at the WRRCS, RRCS, and DICS are gradually opened to let more water pass through town and into the diversion. A real-time flow through the WRRCS, RRCS, and DICS is calculated using a storage-discharge relationship based on gate opening, and the available flow to release is determined based on the volume of water in the Staging Area, the magnitude of the flood and the tributary river flows that need to be mitigated.

In Operation Segment 4, the priority to send flow through the WRRCS and RRCS versus the DICS is given to the WRRCS and RRCS until the WRRCS and RRCS flow has reached the maximum designed flow through town. The remaining flow is then sent through the DICS. The flow split between WRRCS and RRCS is calculated using the water surface elevations from Wild Rice River and Red River. Gate openings for WRRCS, RRCS, and DICS are then calculated separately based on the corresponding designed flow and water surface elevation in the Staging Area.

2.4.1 Record flows from USGS gages:

- 05053000, Wild Rice River at Abercrombie, Q^t_{ABER}
- 0505152130, Red River at Enloe, Q^t_{ENLOE}

2.4.2 Record the water surface elevations in the Staging Area

- Wild Rice River, $Z^t_{STAGING\_AREA\_WRR}$
- Red River, $Z^t_{STAGING\_AREA\_RR}$

2.4.3 Sum current flows at Abercrombie and Enloe, Q^t_{AE}

$$Q^t_{ABER} + Q^t_{ENLOE} = Q^t_{AE}$$

2.4.4 Calculate the flow proportion ratios for WRRCS and RRCS, R^t_{WRRCS} and R^t_{RRCS}

Record the maximum water surface elevation in the Staging Area at Wild Rice River and Red River up to time *t*, Z^t_{max}. The ratios between WRRCS and RRCS are calculated based on the following equations:

$$Z^t{}_{\max} = \max(Z^t_{STAGING\_AREA\_RR}, Z^t_{STAGING\_AREA\_WRR})$$

$$R^t_{RRCS} = \begin{cases} Q^t_{ENLOE} / Q^t_{AE} & Z^t{}_{\max} \le 914 \\ \begin{cases} \dfrac{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \\ \dfrac{0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases} & Z^t{}_{\max} > 914 \end{cases}$$

$$R^t_{WRRCS} = \begin{cases} Q^t_{ABER} / Q^t_{AE} & Z^t{}_{\max} \le 914 \\ \begin{cases} \dfrac{0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \\ \dfrac{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases} & Z^t{}_{\max} > 914 \end{cases}$$

2.4.5 Check Q^t_{AE} hydrograph

- If Q^t_{AE} curve has crested, continue with procedure 2.4.6.

- If Q^t_{AE} curve has not crested, skip procedures 2.4.6-2.4.13 and continue with procedure 2.4.14.

2.4.6 Record the maximum combined Abercrombie and Enloe flow up to time *t*

$$Q^t_{AE\_MAX} = Max\,(Q^t_{AE})$$

2.4.7 Compute designed flow through town using Table 8

$$Q^t_{TOWN} = Table\,8(Q^t_{AE\_MAX})$$

2.4.8 Compare $Q^t_{AE\text{-}MAX}$ with 22,000 cfs, which is the upper limit of what is considered a small flood.

- If $Q^t_{AE\text{-}MAX}$ value is greater than 22,000 cfs, skip procedures 2.4.9-2.4.13 and continue with procedure 2.4.14.
- If $Q^t_{AE\text{-}MAX}$ value is less than 22,000 cfs (i.e., small flood), continue with the procedure 2.4.9.

2.4.9 Check if this flood is a 1997-type long duration flood. 1997 flood had a relative small peak (i.e., $Q^t_{AE\_MAX}$ = 20,000 cfs) and a long duration (17 days with the flow greater than 17,000 cfs). This type of floods should be operated normally due to high flow volume.

- If Z^t_{MAX} (obtained from procedure 2.4.4) is greater than 915.5 feet, this is a 1997-type long duration flood. Skip procedures 2.4.9-2.4.13 and continue with procedure 2.4.14.
- If Z^t_{MAX} is less than 915.5 feet, (i.e., small flood), continue with the procedure 2.4.10 for small flood operation.

2.4.10 Compute the Q^t_{SF} for small flood event

$$Q^t_{SF} = \begin{cases} 1.01^{\Delta t} \times Q^{t-1}_{\mathrm{HOLD}} & \textit{First iteration} \\ \begin{cases} 1.01^{\Delta t} \times Q^{t-1}_{SF} & when\ \ Q^{t-1}_{SF} < Q^t_{TOWN} \\ Q^t_{TOWN} & when\ \ Q^{t-1}_{SF} \geq Q^t_{TOWN} \end{cases} & \textit{Subsequent iterations} \end{cases}$$

where Δt = number of hours per operation iteration.

2.4.11 Compute the allowable flow to pass through WRRCS and RRCS, Q^t_{WRRCS} and Q^t_{RRCS}, respectively, for small flood events. The DICS remains closed.

- Allowable flow to pass the WRRCS (Q^t_{WRRCS})

$$Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{SF}$$

- Allowable flow to pass the RRCS (Q^t_{RRCS})

$$Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{SF}$$

2.4.12 Determine the gate openings for WRRCS and RRCS using the computed allowable flow and the Staging Area water surface elevations using Tables 5 & 6.

- Gate opening at Wild Rice River Control Structure

$$H^t_{WRRCS} = Table\,5(Q^t_{WRRCS}, Z^t_{STAGING\_AREA\_WRR})$$

- Gate opening at Red River Control Structure

$$H^t_{RRCS} = Table\,6\,(Q^t_{RRCS}, Z^t_{STAGING\_AREA\_RR})$$

2.4.13 Continue and repeat the procedures 2.4.1-2.4.13 for small flood events until the computed gate opening + gate invert > Staging Area WSE.

2.4.14 Determine if the water surface elevation in the Staging Area has crested, which would trigger the operation transitioning to the "Operation Segment 5 - Transition". Compare the current water surface elevation in the Staging Area, $Z^t_{STAGING\_AREA\_RR}$, with the water surface elevation from previous operation, $Z^{t-1}_{STAGING\_AREA\_RR}$.

- If the $0.9999 \times Z^t_{STAGING\_AREA\_RR}$ is greater than $Z^{t-1}_{STAGING\_AREA\_RR}$ (i.e., not crested), continue with the procedures in "Operation Segment 4 - Rising". Continue with the Operation Procedure 2.4.15.

- If the $0.9999 \times Z^{t}_{STAGING\_AREA\_RR}$ is less than $Z^{t-1}_{STAGING\_AREA\_RR}$ (i.e., crested), begin "Operation Segment 5 - Transition".

2.4.15 Record flows from USGS gages:

- xxxxxxxxx, Maple River at Durbin, $Q^{t-36/\Delta t}_{MAPLE}$
- 05058980, Sheyenne River at Gol Road, $Q^{t-36/\Delta t}_{SHEY}$
- 05060500, Rush River at Amenia, $Q^{t-36/\Delta t}_{RUSH}$

Record flows from the Operation Procedure 2.4.1

- 05053000, Wild Rice River at Abercrombie, Q^{t}_{ABER}
- 0505152130, Red River at Enloe, Q^{t}_{ENLOE}

2.4.16 Obtain the combined flows at Abercrombie and Enloe, Q^{t}_{AE} from procedure 2.4.3

2.4.17 Record the maximum combined Abercrombie and Enloe flow up to time *t*

$$Q^{t}_{AE\_MAX} = Max(Q^{t}_{AE})$$

2.4.18 Compute flow reduction for tributary rivers

- Sheyenne River

$$Q^{t}{}_{SHEY\_REDUC} = \begin{cases} 0 & when \quad Q^{t-36/\Delta t}_{SHEY} \le 2{,}000\ cfs \\ Q^{t-36/\Delta t}_{SHEY} - 2{,}000 & when \quad 2{,}000 \le Q^{t-36/\Delta t}_{SHEY} \le 4{,}600\ cfs \\ 0.5 \times (Q^{t-36/\Delta t}_{SHEY} - 4{,}600) + 2{,}600 & when \quad Q^{t-36/\Delta t}_{SHEY} > 4{,}600\ cfs \end{cases}$$

- Maple River

$$Q^{t}{}_{MAPLE\_REDUC} = \begin{cases} 0 & when \quad Q^{t-36/\Delta t}_{MAPLE} \le 3{,}000\ cfs \\ 0.8 \times (Q^{t-36/\Delta t}_{MAPLE} - 3{,}000) & when \quad Q^{t-36/\Delta t}_{MAPLE} > 3{,}000\ cfs \end{cases}$$

- Rush River

$$Q^{t}{}_{RUSH\_REDUC} = Q^{t-36/\Delta t}_{RUSH}$$

2.4.19 Compute total flow reduction

$$Q^{t}_{REDUCTION} = Q^{t}{}_{SHEY\_REDUC} + Q^{t}{}_{MAPLE\_REDUC} + Q^{t}{}_{RUSH\_REDUC}$$

2.4.20 Record maximum flow reduction up to time t

$$Q^{t}_{REDUCTION\_MAX} = Max(Q^{t}{}_{REDUCTION})$$

2.4.21 Compute the parameter ***a*** using Table 3

$$a = Table\ 3(Q^{t}_{AE\_MAX}, Q^{t}_{REDUCTION\_MAX})$$

2.4.22 Compute the volume of water in the Staging Area using Table 4

$$V^{t}_{STAGING\_AREA} = Table\ 4(Z^{t}_{STAGING\_AREA\_RR})$$

2.4.23 Compute Q^{t}_{RISING}

$$Q^{t}_{\mathrm{RISING}} = a\,(V^{t}_{STAGING\_AREA\_RR})^{1.3} - Q^{t}{}_{REDUCTION}$$

2.4.24 Compute the designed flow through town using Table 8

$$Q^{t}_{TOWN} = Table\ 8(Q^{t}_{AE\_MAX})$$

2.4.25 Compare Q^{t}_{TOWN} with Q^{t}_{RISING}.

- If Q^{t}_{TOWN} is greater than Q^{t}_{RISING}, use Q^{t}_{RISING} as the allowable flow. Continue with Operation Procedure 2.4.26.
- If Q^{t}_{RISING} is greater than Q^{t}_{TOWN}, use Q^{t}_{TOWN} as the allowable flow. Continue with Operation Procedure 2.4.27.

2.4.26 If Q^t_{TOWN} is greater than Q^t_{RISING}, compute the allowable flow to pass through WRRCS and RRCS, Q^t_{WRRCS} and Q^t_{RRCS}. The DICS remains closed. Then skip to Operation Procedure 2.4.29.

- Allowable flow to pass the WRRCS (Q^t_{WRRCS})

$$Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{\text{RISING}} \qquad when \quad Q^t_{\text{RISING}} \le Q^t_{TOWN}$$

- Allowable flow to pass the RRCS (Q^t_{RRCS})

$$Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{\text{RISING}} \qquad when \quad Q^t_{\text{RISING}} \le Q^t_{TOWN}$$

- Allowable flow to pass the *DICS* (Q^t_{DICS})

$$Q^t_{DICS} = 0 \qquad when \quad Q^t_{\text{RISING}} \le Q^t_{TOWN}$$

2.4.27 Record the time as the calculated Q^t_{RISING} exceeds Q^t_{TOWN}, T^0_{TOWN}.

2.4.28 If Q^t_{RISING} is greater than Q^t_{TOWN}, compute the allowable flow to pass through WRRCS, RRCS, and DICS, Q^t_{WRRCS}, Q^t_{RRCS}, and Q^t_{DICS}, respectively.

- Allowable flow to pass the WRRCS (Q^t_{WRRCS})

$$Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{TOWN} \qquad when \quad Q^t_{\text{RISING}} > Q^t_{TOWN}$$

- Allowable flow to pass the RRCS (Q^t_{RRCS})

$$Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{TOWN} \qquad when \quad Q^t_{\text{RISING}} > Q^t_{TOWN}$$

- Allowable flow to pass the DICS (Q^t_{DICS})

$$Q^t_{DICS} = \begin{cases} Q^t_{\text{RISING}} - Q^t_{TOWN} & when \quad Q^t_{\text{RISING}} < Q^t_{TOWN} + Q^t_{DI\_MAX} \\ Q^t_{DI\_MAX} & when \quad Q^t_{\text{RISING}} - Q^t_{TOWN} \ge Q^t_{DI\_MAX} \end{cases}$$

Note: $Q^t_{DI\_MAX}$ = 20,000 cfs for flood events less than 200-year i.e., $Q^t_{AE\_MAX}$ = 48,000 cfs, and $Q^t_{DI\_MAX}$ = 25,000 cfs for the flood equal to the 500-year event i.e., $Q^t_{AE\_MAX}$ = 60,000 cfs. For any flood events that are larger than the 200-year and less than the 500-year event, $Q^t_{DI\_MAX}$ can be calculated using linear interpolation method.

2.4.29 Determine the gate openings for WRRCS, RRCS, and DICS using the computed allowable flow and the Staging Area water surface elevation using Tables 5-7.

- Gate opening at Wild Rice River Control Structure

$$H^t_{WRRCS} = Table\ 5(Q^t_{WRRCS}, Z^t_{STAGING\_AREA\_WRR})$$

- Gate opening at Red River Control Structure

$$H^t_{RRCS} = Table\ 6\ (Q^t_{RRCS}, Z^t_{STAGING\_AREA\_RR})$$

- Gate opening at Diversion Inlet Control Structure

$$H^t_{DICS} = Table\ 7\ (Q^t_{DIVCS}, Z^t_{STAGING\_AREA\_WRR})$$

2.4.30 Continue to the next operation iteration (i.e., Operation Procedure 2.4.1) and repeat procedures for the gate operation in "Operation Segment 4 - Rising" until the operation procedure transitions to the "Operation Segment 5 – Transition" (i.e., 2.4.14).

2.5 Operation Segment 5 – Transition

Operation Segment 5 serves as a transition period between Rising and Falling Segments to calculate the available flow to release through WRRCS, RRCS, and DICS.

2.5.1 Record the water surface elevations in the Staging Area:

- Wild Rice River, $Z^t_{STAGING\_AREA\_WRR}$

- Red River, $Z^t_{STAGING\_AREA\_RR}$

2.5.2 Record flows from USGS gages:

- 05053000, Wild Rice River at Abercrombie, Q^t_{ABER}
- 0505152130, Red River at Enloe, Q^t_{ENLOE}
- xxxxxxxxx, Maple River at Durbin, $Q^{t-36/\Delta t}_{MAPLE}$
- 05058980, Sheyenne River at Gol Road, $Q^{t-36/\Delta t}_{SHEY}$
- 05060500, Rush River at Amenia, $Q^{t-36/\Delta t}_{RUSH}$

2.5.3 Sum current flows at Abercrombie and Enloe, Q^t_{AE}

$$Q^t_{ABER} + Q^t_{ENLOE} = Q^t_{AE}$$

2.5.4 Record the maximum water surface elevation in the Staging Area at Wild Rice River and Red River up to time *t*, Z^t_{max}. Calculate the flow proportion ratios for WRRCS and RRCS, R^t_{WRRCS} and R^t_{RRCS}

$$Z^t_{\max} = \max(Z^t_{STAGING\_AREA\_RR}, Z^t_{STAGING\_AREA\_WRR})$$

$$R^t_{RRCS} = \begin{cases} Q^t_{ENLOE} / Q^t_{AE} & Z^t_{\max} \le 914 \\ \begin{cases} \dfrac{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \\ \dfrac{0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases} & Z^t_{\max} > 914 \end{cases}$$

$$R^t_{WRRCS} = \begin{cases} Q^t_{ABER} / Q^t_{AE} & Z^t_{\max} \le 914 \\ \begin{cases} \dfrac{0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \\ \dfrac{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases} & Z^t_{\max} > 914 \end{cases}$$

2.5.5 Record the maximum combined Abercrombie and Enloe flow up to time *t*

$$Q^t_{AE\_MAX} = Max(Q^t_{AE})$$

2.5.6 Compute flow reduction for tributary rivers

- Sheyenne River

$$Q^t{}_{SHEY\_REDUC} = \begin{cases} 0 & when \quad Q^{t-36/\Delta t}_{SHEY} \le 2{,}000\ cfs \\ Q^{t-36/\Delta t}_{SHEY} - 2{,}000 & when \quad 2{,}000 \le Q^{t-36/\Delta t}_{SHEY} \le 4{,}600\ cfs \\ 0.5 \times (Q^{t-36/\Delta t}_{SHEY} - 4{,}600) + 2{,}600 & when \quad Q^{t-36/\Delta t}_{SHEY} > 4{,}600\ cfs \end{cases}$$

- Maple River

$$Q^t{}_{MAPLE\_REDUC} = \begin{cases} 0 & when \quad Q^{t-36/\Delta t}_{MAPLE} \le 3{,}000\ cfs \\ 0.8 \times (Q^{t-36/\Delta t}_{MAPLE} - 3{,}000) & when \quad Q^{t-36/\Delta t}_{MAPLE} > 3{,}000\ cfs \end{cases}$$

- Rush River

$$Q^t{}_{RUSH\_REDUC} = Q^{t-36/\Delta t}_{RUSH}$$

2.5.7 Compute total flow reduction

$$Q^t_{REDUCTION} = Q^t{}_{SHEY\_REDUC} + Q^t{}_{MAPLE\_REDUC} + Q^t{}_{RUSH\_REDUC}$$

2.5.8 Record maximum flow reduction up to time t

$$Q^t_{REDUCTION\_MAX} = Max(Q^t{}_{REDUCTION})$$

2.5.9 Compute parameter ***b*** using Table 9. Similar to parameter ***a***, ***b*** is a function of the maximum combined Abercrombie and Enloe flow and the maximum flow reduction.

$$b = Table\ 9(Q^t_{AE\_MAX}, Q^t_{REDUCTION\_MAX})$$

2.5.10 Compute the volume of water in the Staging Area based on the water surface elevation in the Staging Area using Table 4

$$V^t_{STAGING\_AREA} = Table\ 4(Z^t_{STAGING\_AREA\_RR})$$

2.5.11 Compute $Q_{TRANSITION}$. It should be noted that in the first iteration of $Q_{TRANSITION}$ computation (Operation Segment 5 - Transition), Q_{RISING} is used.

$$Q^t_{\text{TRANSITION}} = \begin{cases} b^{\Delta t} \times Q^{t-1}_{\text{RISING}} - Q^t{}_{REDUCTION} & \textit{First iteration} \\ b^{\Delta t} \times Q^{t-1}_{\text{TRANSITION}} - Q^t{}_{REDUCTION} & \textit{Subsequent iterations} \end{cases}$$

2.5.12 Compute parameter ***c*** based on the maximum combined Abercrombie and Enloe flow using Table 10

$$c = Table\ 10(Q^t_{AE\_MAX})$$

2.5.13 Compute $Q_{FALLING}$ using parameter ***c***, the volume of water in the Staging Area, and tributary flow reduction.

$$Q^t_{\text{FALLING}} = c \times (V^t_{STAGING\_AREA} + 344{,}000)^{1.35} - Q^t{}_{REDUCTION}$$

2.5.14 Compare $Q_{TRANSITION}$ and $Q_{FALLING}$.

- If the $Q_{FALLING}$ is greater than $Q_{TRANSITION}$, continue with procedure 2.5.16.
- If $Q_{TRANSITION}$ is greater than $Q_{FALLING}$, conduct procedure 2.5.15 and then begin "Operation Segment 6 - Falling".

2.5.15 Record the $Q^{t-1}{}_{DICS}$ from the previous operation iteration, which will be used in the allowable flow calculation for DICS in "Operation Segment 6 – Falling".

2.5.16 Compute the designed flow through town using Table 8

$$Q^t_{TOWN} = Table 8(Q^t_{AE\_MAX})$$

2.5.17 Compute the designed time duration to allow $Q^t{}_{TOWN}$, $DT^t{}_{QTOWN}$, based on the maximum combined Abercrombie and Enloe flow using Table 11

$$DT^t_{QTOWN} = Table 11(Q^t_{AE\_MAX})$$

2.5.18 Compute the actual duration, $\Delta T^t{}_{QTOWN}$, that the allowable flow, $Q^t{}_{TOWN}$, has been maintained. $T^0{}_{QTOWN}$ is obtained from Operation Procedure 2.4.27.

$$\Delta T^t_{QTOWN} = T^t_{CURRENT} - T^0_{QTOWN}$$

2.5.19 Compare the $\Delta T^t{}_{QTOWN}$ with $DT^t{}_{QTOWN}$.

- If $DT^t{}_{QTOWN}$ is greater than $\Delta T^t{}_{QTOWN}$, $Q^t{}_{TOWN}$ is used to compute the allowable flow to pass WRRCS and RRCS. Continue with the Operation Procedure 2.5.20.
- If $\Delta T^t{}_{QTOWN}$ is greater than $DT^t{}_{QTOWN}$, compute the designed receding flow to pass through town. Continue with the Operation Procedure 2.5.21.

2.5.20 If $DT^t{}_{QTOWN}$ is greater than $\Delta T^t{}_{QTOWN}$, $Q^t{}_{TOWN}$ is used to compute the allowable flow to pass WRRCS and RRCS, $Q^t{}_{WRRCS}$ and $Q^t{}_{RRCS}$ and compute the DICS flow. Then skip to Operation Procedure 2.5.23.

- Allowable flow to pass the *WRRCS* (Q^t_{WRRCS})
  $Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{TOWN}$
- Allowable flow to pass the *RRCS* (Q^t_{RRCS})
  $Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{TOWN}$
- Allowable flow to pass the *DICS* (Q^t_{DICS})

$$Q^t_{DICS} = \begin{cases} Q^t_{\text{TRANSITION}} - Q^t_{TOWN} & when \quad Q^t_{\text{TRANSITION}} < Q^t_{TOWN} + Q^t_{DI\_MAX} \\ Q^t_{DI\_MAX} & when \quad Q^t_{\text{TRANSITION}} - Q^t_{TOWN} \geq Q^t_{DI\_MAX} \end{cases}$$

2.5.21 If ΔT^t_{QTOWN} is greater than DT^t_{QTOWN}, compute the designed receding flow to pass through town, $Q^t_{TOWN\text{-}RECEDING}$

$$Q^t_{TOWN-RECEDING} = \begin{cases} 0.994^{\Delta t} \times Q^{t-1}_{TOWN} & \textit{First iteration} \\ \begin{cases} 0.994^{\Delta t} \times Q^{t-1}_{TOWN-RECEDING} & Q^{t-1}_{TOWN-RECEDING} > 8{,}000\,cfs \\ 8{,}000\,cfs & Q^{t-1}_{TOWN-RECEDING} < 8{,}000\,cfs \end{cases} & \textit{Subsequent iterations} \end{cases}$$

where Δt = number of hours per operation iteration.

2.5.22 Use the computed $Q^t_{TOWN\text{-}RECEDING}$ as the allowable flow to pass through the towns

- Allowable flow to pass the WRRCS (Q^t_{WRRCS})
  $Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{\text{QTOWN-RECEDING}}$
- Allowable flow to pass the RRCS (Q^t_{RRCS})
  $Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{\text{QTOWN-RECEDING}}$
- Allowable flow to pass the DICS (Q^t_{DICS})

$$Q^t_{DICS} = \begin{cases} Q^t_{\text{TRANSITION}} - Q^t_{\text{QTOWN-RECEDING}} & when \quad Q^t_{\text{TRANSITION}} < Q^t_{TOWN} + Q^t_{DI\_MAX} \\ Q^t_{DI\_MAX} & when \quad Q^t_{\text{TRANSITION}} - Q^t_{TOWN} \geq Q^t_{DI\_MAX} \end{cases}$$

2.5.23 Determine the gate openings for WRRCS, RRCS, and DICS using the computed allowable flow and the Staging Area water surface elevation using Tables 5-7.

- Gate opening at Wild Rice River Control Structure
  $H^t_{WRRCS} = Table\ 5(Q^t_{WRRCS}, Z^t_{STAGING\_AREA\_WRR})$
- Gate opening at Red River Control Structure
  $H^t_{RRCS} = Table\ 6\ (Q^t_{RRCS}, Z^t_{STAGING\_AREA\_RR})$
- Gate opening at Diversion Inlet Control Structure
  $H^t_{DICS} = Table\ 7\ (Q^t_{DICS}, Z^t_{STAGING\_AREA\_WRR})$

2.5.24 Continue to the next operation iteration and repeat procedures for the gate operation in "Operation Segment 5 - Transition".

2.6 Operation Segment 6 – Falling

Operation Segment 6 is designed to efficiently release water from the Staging Area as fast as possible without adversely affecting adjacent land. The drawdown has been designed to match historical receding limb hydrographs.

2.6.1 Record flows from USGS gages:

- 05053000, Wild Rice River at Abercrombie, Q^t_{ABER}
- 0505152130, Red River at Enloe, Q^t_{ENLOE}

2.6.2 Record the water surface elevations in the Staging Area:

- Wild Rice River, $Z^t_{STAGING\_AREA\_WRR}$
- Red River, $Z^t_{STAGING\_AREA\_RR}$

2.6.3 Sum current flows at Abercrombie and Enloe, Q^t_{AE}

$$Q^t_{ABER} + Q^t_{ENLOE} = Q^t_{AE}$$

2.6.4 Record the maximum water surface elevation in the Staging Area at Wild Rice River and Red River up to time *t*, Z^t_{max}. Calculate the flow proportion ratios for WRRCS and RRCS, R^t_{WRRCS} and R^t_{RRCS}

$$Z^t_{\max} = \max(Z^t_{STAGING\_AREA\_RR}, Z^t_{STAGING\_AREA\_WRR})$$

$$R^t_{RRCS} = \begin{cases} Q^t_{ENLOE} / Q^t_{AE} & Z^t_{\max} \le 914 \\ \dfrac{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \quad Z^t_{\max} > 914 \\ \dfrac{0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases}$$

$$R^t_{WRRCS} = \begin{cases} Q^t_{ABER} / Q^t_{AE} & Z^t_{\max} \le 914 \\ \dfrac{0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \quad Z^t_{\max} > 914 \\ \dfrac{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases}$$

2.6.5 Compute the actual duration, ΔT^t_{QTOWN}, that the allowable flow, Q^t_{TOWN}, has been maintained. T^0_{QTOWN} is obtained from Operation Procedure 2.4.27.

$$\Delta T^t_{QTOWN} = T^t_{CURRENT} - T^0_{QTOWN}$$

2.6.6 Compare the ΔT^t_{QTOWN} with DT^t_{QTOWN}. DT^t_{QTOWN} is obtained from Operation Procedure 2.5.17.

- If DT^t_{QTOWN} is greater than ΔT^t_{QTOWN}, continue with procedure 2.6.7.
- If DT^t_{QTOWN} is less than ΔT^t_{QTOWN}, continue with procedure 2.6.8.

2.6.7 Use Q^t_{TOWN} to compute the allowable flow to pass WRRCS and RRCS, Q^t_{WRRCS} and Q^t_{RRCS}. Q^t_{TOWN} is obtained from Operation Procedure 2.5.16. Then skip to Operation Procedure 2.6.10.

- Allowable flow to pass the *WRRCS* (Q^t_{WRRCS})
  $$Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{TOWN}$$
- Allowable flow to pass the *RRCS* (Q^t_{RRCS})
  $$Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{TOWN}$$

2.6.8 If DT^t_{QTOWN} is less than ΔT^t_{QTOWN}, compute the designed receding flow to pass through town, $Q^t_{TOWN\text{-}RECEDING}$

$$Q^t_{TOWN-RECEDING} = \begin{cases} 0.994^{\Delta t} \times Q^{t-1}_{TOWN} & \textit{First iteration} \\ \begin{cases} 0.994^{\Delta t} \times Q^{t-1}_{TOWN-RECEDING} & Q^{t-1}_{TOWN-RECEDING} > 8{,}000\,cfs \\ 8{,}000\,cfs & Q^{t-1}_{TOWN-RECEDING} < 8{,}000\,cfs \end{cases} & \textit{Subsequent iterations} \end{cases}$$

2.6.9 Use computed $Q^{t}_{TOWN\text{-}RECEDING}$ as the allowable flow to pass through the town

- Allowable flow to pass the WRRCS (Q^t_{WRRCS})
  $$Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{\text{QTOWN-RECEDING}}$$
- Allowable flow to pass the RRCS (Q^t_{RRCS})
  $$Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{\text{QTOWN-RECEDING}}$$

2.6.10 Calculate the allowable flow to pass the DICS, Q^t_{DICS}

The calculation of the allowable flow to pass through the DICS is based on the following three steps using Equations A-C. Each of these steps might take more than one operation iterations based on the magnitude of diversion flow and water surface elevation in the Staging Area. It should be noted that Equation 2 may or may not be necessary depending on the magnitude of the flood and the water surface elevation in the Staging Area.

- Maintain a constant increasing rate through DICS until the maximum design flow is reached, $Q^t_{DI\_MAX}$, if possible (Equation A). If the water surface elevation in the Staging Area drops below the top of the gates and the calculated diversion flow, Q^t_{DICS}, using equation A does not reach the maximum design flow, then skip Equation B and continue to Equation C.
- Maintain the maximum DICS flow, $Q^t_{DI\_MAX}$, as long as possible (Equation B), and
- If DICS flow cannot maintain maximum design flow, open gates (Equation C).

$$Q^t_{DICS} = \begin{cases} 1.005^{\Delta t} \times Q^{t-1}_{DICS} & Q^{t-1}_{DICS} < Q^t_{DI\_MAX} \textbf{ \& } \textit{SA WSE is above the top of gates} \text{ (A)} \\ Q^t_{DI\_MAX} & Q^{t-1}_{DICS} = Q^t_{DI\_MAX} \textbf{ \& } \textit{SA WSE is above the top of gates} \text{ (B)} \\ Table\ 12\,(Z^t_{STAGING\_AREA\_WRR}) & Q^{t-1}_{DICS} < Q^t_{DI\_MAX} \textbf{ \& } \textit{SA WSE is below the top of gates} \text{ (C)} \end{cases}$$

where Δt = number of hours per operation iteration.

2.6.11 Determine the gate openings for WRRCS, RRCS, and DICS using the computed allowable flow and the Staging Area water surface elevation using Tables 5-7.

- Gate opening at Wild Rice River Control Structure
  $$H^t_{WRRCS} = Table\ 5(Q^t_{WRRCS}, Z^t_{STAGING\_AREA\_WRR})$$
- Gate opening at Red River Control Structure
  $$H^t_{RRCS} = Table\ 6\ (Q^t_{RRCS}, Z^t_{STAGING\_AREA\_RR})$$
- Gate opening at Diversion Inlet Control Structure
  $$H^t_{DICS} = Table\ 7\ (Q^t_{DICS}, Z^t_{STAGING\_AREA\_WRR})$$

2.6.12 Continue the iteration and repeat the procedures in "Operation Segment 6 - Falling" until the sum of the computed gate opening and gate invert is greater than the Staging Area water surface elevation for the DICS, WRRCS, and RRCS. Then the gates on these structures can be returned to their normal (pre-flood) positions. The time at which the three control structure gates are returned to their normal position will be dependent on the receding limb of the current flood.

3. Operation Plan for Floods Greater than 500-year and Less than or Equal to the IDF

A National Weather Service (NWS) flood forecast will be required to determine if preparation for extreme event operation shall take place. This is expected to occur less than 0.2% of the time. Within the extreme event analysis, the objectives shift from minimizing downstream impacts (normal operation) to protecting the project infrastructure from failure. The operation procedures and guidelines for the floods greater than a 500-year through IDF have been summarized as follows:

- Provide no restriction through any of the control structures until the maximum stage through the FDRA reaches 40 feet, at which point the RRCS and WRRCS will be operated to maintain 40 feet (or less) through the FDRA.
- The DICS gates are to be wide open throughout the duration of the event.
- The RRCS and WRRCS will be operated as necessary to maintain a maximum water surface elevation in the Staging Area of 925 feet.

The WRRCS and RRCS gates are operated based on the following rules:

3.1 Record flows from USGS gages:

- 05053000, Wild Rice River at Abercrombie, Q^t_{ABER}
- 0505152130, Red River at Enloe,

3.2 Sum current flows at Abercrombie and Enloe, Q^t_{AE}

$$Q^t_{ABER} + Q^t_{ENLOE} = Q^t_{AE}$$

3.3 Record the water surface elevations in the Staging Area

- Wild Rice River, $Z^t_{STAGING\_AREA\_WRR}$
- Red River, $Z^t_{STAGING\_AREA\_RR}$

3.4 Calculate the flow proportion ratios for WRRCS and RRCS, R^t_{WRRCS} and R^t_{RRCS}

Record the maximum water surface elevation in the Staging Area at Wild Rice River and Red River up to time *t*, Z^t_{max}.

$$Z^t{}_{\max} = \max(Z^t_{STAGING\_AREA\_RR}, Z^t_{STAGING\_AREA\_WRR})$$

The ratios between WRRCS and RRCS are calculated based on the following equations:

$$R^t_{RRCS} = \begin{cases} Q^t_{ENLOE} / Q^t_{AE} & Z^t{}_{\max} \le 914 \\ \dfrac{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \\ \dfrac{0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases} \quad Z^t{}_{\max} > 914$$

$$R^t_{WRRCS} = \begin{cases} Q^t_{ABER} / Q^t_{AE} & Z^t{}_{\max} \le 914 \\ \dfrac{0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \\ \dfrac{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases} \quad Z^t{}_{\max} > 914$$

3.5 Record the maximum combined Abercrombie and Enloe flow up to time *t*

$$Q^t_{AE\_MAX} = Max(Q^t_{AE})$$

3.6 Compute the designed flow through town using Table 8

$Q^t_{TOWN} = Table\ 8(Q^t_{AE\_MAX})$

3.7 Compute the allowable flow to pass through WRRCS and RRCS, Q^t_{WRRCS} and $Q^t_{RRCS.}$

- Allowable flow to pass the WRRCS (Q^t_{WRRCS})
  $Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{\text{TOWN}}$
- Allowable flow to pass the RRCS (Q^t_{RRCS})
  $Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{\text{TOWN}}$

3.8 Determine the gate openings for WRRCS, RRCS, and DICS using the computed allowable flow and the Staging Area water surface elevation (Tables 5-7).

- Gate opening at Wild Rice River Control Structure
  $H^t_{WRRCS} = Table\ 5(Q^t_{WRRCS}, Z^t_{STAGING\_AREA\_WRR})$
- Gate opening at Red River Control Structure
  $H^t_{RRCS} = Table\ 6\ (Q^t_{RRCS}, Z^t_{STAGING\_AREA\_RR})$
- Gate opening at Diversion Inlet Control Structure
  $H^t_{DICS} = 26\,feet$

3.9 Continue the iteration and repeat the procedures in the IDF operation flow chart (Flow chart A) until the sum of the computed gate opening and gate invert is greater than the Staging Area water surface elevation for the DICS, WRRCS, and RRCS. Then the gates on these structures can be returned to their normal (pre-flood) positions.

4. Operation Plan for Flood Greater than the IDF

If the NWS forecast indicates a possibility of a flood greater than an IDF, the diversion operation is to be based on the following guidelines:

- The cities send out an evacuation preparation order when the NWS forecast shows a chance of flood greater than the IDF.
- Provide no restriction through any of the control structures until the maximum stage through the Flood Damage Reduction Area (FDRA, area through town) reaches 40 feet, at which point the RRCS and WRRCS will be operated to maintain 40 feet (or less) through the FDRA.
- The DICS gates are to be wide open throughout the duration of the event.
- The cities send out an evacuation order when the water surface elevation in the Staging Area reaches a critical elevation (i.e., an elevation between 918 to 922 feet depending on the flood magnitudes).
- The RRCS and WRRCS will gradually release more flow to maintain a relatively constant acceptable water surface elevation in the Staging Area (i.e., an elevation of 924.5 feet).

  This approach is designed to:
  - Provide sufficient time for the evacuation
  - Maximize the use of the Staging Area storage
  - Reduce the impact through the Flood Damage Reduction Area by only releasing what is necessary based on the magnitude of the flood.

The Diversion Inlet Control Structure Gates are wide open throughout the duration of this flood event to divert as much flow as possible, and the WRRCS and RRCS gates are operated based on the following rules:

4.1 Record flows from USGS gages:

- 05053000, Wild Rice River at Abercrombie, Q^t_{ABER}
- 0505152130, Red River at Enloe,

4.2 Sum current flows at Abercrombie and Enloe, Q^t_{AE}

$$Q^t_{ABER} + Q^t_{ENLOE} = Q^t_{AE}$$

4.3 Record the water surface elevations in the Staging Area at current iteration:

- Wild Rice River, $Z^t_{STAGING\_AREA\_WRR}$
- Red River, $Z^t_{STAGING\_AREA\_RR}$

Record the water surface elevations at Red River in the Staging Area from previous operation iterations *t-1* and *t-2*:

- Red River, $Z^{t-1}_{STAGING\_AREA\_RR}$ and $Z^{t-2}_{STAGING\_AREA\_RR}$

4.4 Calculate the flow proportion ratios for WRRCS and RRCS, R^t_{WRRCS} and R^t_{RRCS}

Record the maximum water surface elevation in the Staging Area at Wild Rice River and Red River up to time *t*, Z^t_{max}.

$$Z^t_{\max} = \max(Z^t_{STAGING\_AREA\_RR}, Z^t_{STAGING\_AREA\_WRR})$$

The ratios between WRRCS and RRCS are calculated based on the following equations:

$$R^t_{RRCS} = \begin{cases} Q^t_{ENLOE} / Q^t_{AE} & Z^t_{\max} \le 914 \\ \begin{cases} \dfrac{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \\ \dfrac{0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases} & Z^t_{\max} > 914 \end{cases}$$

$$R^t_{WRRCS} = \begin{cases} Q^t_{ABER} / Q^t_{AE} & Z^t_{\max} \le 914 \\ \begin{cases} \dfrac{0.2}{Z^t_{STAGING\_AREA\_RR} - Z^t_{STAGING\_AREA\_WRR} + 0.4} & Z^t_{STAGING\_AREA\_RR} > Z^t_{STAGING\_AREA\_WRR} \\ \dfrac{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.2}{Z^t_{STAGING\_AREA\_WRR} - Z^t_{STAGING\_AREA\_RR} + 0.4} & Z^t_{STAGING\_AREA\_RR} < Z^t_{STAGING\_AREA\_WRR} \end{cases} & Z^t_{\max} > 914 \end{cases}$$

4.5 Determine if the maximum water surface elevation, Z^t_{max}, in the Staging Area has reached the critical elevation (e.g., 924 feet)

- if the maximum water surface elevation, Z^t_{max}, in the Staging Area is less than the critical elevation (e.g., 924 feet), continue with the procedure 4.6.
- if the maximum water surface elevation, Z^t_{max}, in the Staging Area is equal to or greater than the critical elevation (e.g., 924 feet), continue with the procedure 4.10.

4.6 Record the maximum combined Abercrombie and Enloe flow up to time *t*

$$Q^t_{AE\_MAX} = Max(Q^t_{AE})$$

4.7 Compute the designed flow through town using Table 8

$$Q^t_{TOWN} = Table\,8(Q^t_{AE\_MAX})$$

4.8 Compute the allowable flow to pass through WRRCS and RRCS, Q^t_{WRRCS} and Q^t_{RRCS}.

- Allowable flow to pass the WRRCS (Q^t_{WRRCS})
  $Q^t_{WRRCS} = R^t_{WRRCS} \times Q^t_{\text{TOWN}}$
- Allowable flow to pass the RRCS (Q^t_{RRCS})
  $Q^t_{RRCS} = R^t_{RRCS} \times Q^t_{\text{TOWN}}$

4.9 Determine the gate openings for WRRCS, RRCS, and DICS using the computed allowable flow and the Staging Area water surface elevation (Tables 5-7).

- Gate opening at Wild Rice River Control Structure
  $H^t_{WRRCS} = Table\ 5(Q^t_{WRRCS}, Z^t_{STAGING\_AREA\_WRR})$
- Gate opening at Red River Control Structure
  $H^t_{RRCS} = Table\ 6\ (Q^t_{RRCS}, Z^t_{STAGING\_AREA\_RR})$
- Gate opening at Diversion Inlet Control Structure
  $H^t_{DICS} = 26 feet$

Continue the iteration and repeat the operation procedures 4.1-4.9 in PMF operation flow chart (Flow chart A) until the maximum water surface elevation in the Staging Area is equal to or greater than the critical elevation (e.g., 924 feet).

4.10 Record the Diversion Inlet Control Structure flow from previous operation iteration, Q^{t-1}_{DICS}

4.11 Compute the volume of water in the Staging Area for the current operation iteration *t* and previous operation iterations *t-1* and *t-2* (Table 4):

$V^t_{STAGING\_AREA} = Table\ 4(Z^t_{STAGING\_AREA\_RR})$

$V^{t-1}_{STAGING\_AREA} = Table\ 4(Z^{t-1}_{STAGING\_AREA\_RR})$

$V^{t-2}_{STAGING\_AREA} = Table\ 4(Z^{t-2}_{STAGING\_AREA\_RR})$

4.12 Compute average volume of water in the Staging Area, $\overline{V^t_{STAGING\_AREA}}$, from the recent three operation iterations *t*, *t-1* and *t-2*:

$$\overline{V^t_{STAGING\_AREA}} = (V^t_{STAGING\_AREA} + V^{t-1}_{STAGING\_AREA} + V^{t-2}_{STAGING\_AREA})/3$$

This equation is applied to estimate average volume of water in the Staging Area by smoothing the errors caused by the variations in the water surface elevation that might occur during the extreme large flood events.

4.13 Compute the available flow to pass through the town and DICS gates

$$Q^t_{PMF} = \frac{(\overline{V_{STAGING\_AREA}} - 308496) \times 43560}{3600 \times \Delta t}$$

where 308,496 is the volume of water in the Staging Area in ac-ft corresponding to a water surface elevation of 924 feet. The equation is derived to calculate the volume of water that is above 924 feet in the Staging Area, which will be released through DICS, WRRCS, and RRCS gates.

4.14 Compute the allowable flow to pass through WRRCS and RRCS, Q^t_{WRRCS} and Q^t_{RRCS}. Since the water surface elevation in the Staging Area is constantly high during the PMF operation (i.e., above 924 feet), it is reasonable to assume that the flow passing through the DICS gates at current iteration remains the same as the previous iteration.

- Allowable flow to pass the WRRCS (Q^t_{WRRCS})
  $Q^t_{WRRCS} = R^t_{WRRCS} \times (Q^t_{PMF} - Q^{t-1}_{DICS})$

- Allowable flow to pass the RRCS *(Q^t_{RRCS})*
  $Q^t_{RRCS} = R^t_{RRCS} \times (Q^t_{PMF} - Q^{t-1}_{DICS})$

4.15 Determine the gate openings for WRRCS and RRCS using the computed allowable flow and the Staging Area water surface elevation (Tables 5-7).

- Gate opening at Wild Rice River Control Structure
  $H^t_{WRRCS} = Table\ 5(Q^t_{WRRCS}, Z^t_{STAGING\_AREA\_WRR})$
- Gate opening at Red River Control Structure
  $H^t_{RRCS} = Table\ 6\ (Q^t_{RRCS}, Z^t_{STAGING\_AREA\_RR})$
- Gate opening at Diversion Inlet Control Structure
  $H^t_{DICS} = 26 feet$

4.16 Continue the iteration and repeat the procedures in the PMF operation flow chart (Flow chart A) until the sum of the computed gate opening and gate invert is greater than the Staging Area water surface elevation for the DICS, WRRCS, and RRCS. Then the gates on these structures can be returned to their normal (pre-flood) positions. The sensitivity analysis shows that 2-hour diversion operation iteration (i.e., Δt =2 hour) generates more reasonable operation results for the PMF operation.

5. Verification of Diversion Operation to Maintain a Level Pool in the Staging Area

To verify if the gate operation is maintaining a relatively level pool from one side of the staging area to the other (between the Wild Rice River and the Red River), a sensitivity analysis was conducted with varied inflow hydrology to the project. First, the historical records at Enloe on the Red River, and Abercrombie on the Wild Rice River were examined. The peak flow ratios between Abercrombie and Enloe were mostly near 45:55, and the most extreme ratio was 36:64. Several model runs were created that had varying inflow ratios between Abercrombie and Enloe. The ratios were 20:80, 30:70, 50:50, 60:40, 70:30 and were all evaluated for the 50-, 100-, and 500-year flood events.

The simulation results showed that water surface differential between the Wild Rice River and Red River in the Staging Area for most of the scenarios ranged from 0.1 to 0.5 feet, and the maximum water surface differential between the Wild Rice River and Red River of the North was 0.9 feet with the flow ratio between Abercrombie and Enloe of 20:80. These results indicate that the approach to calculate the allowable flow through DICS, WRRCS, and RRCS using the current operation is able to maintain a relatively level pool in the Staging Area during a flood operation.

6. Abbreviations and Notations

a: Coefficient for the Nonlinear Reservoir Model (Operation Segment 4 - Rising)
b: Coefficient for the Nonlinear Reservoir Model (Operation Segment 5 - Transition)
c: Coefficient for the Nonlinear Reservoir Model (Operation Segment 5 - Transition)
DT^t_{QTOWN}: Designed time duration to allow maximum flow through the town, Q^t_{TOWN} (hr)
H^t_{DICS}: Gate opening at the Diversion Inlet Control Structure

H^t_{RRCS} : Gate opening at the Red River Control Structure

H^t_{WRRCS} : Gate opening at the Wild Rice River Control Structure

Q^t_{ABER} : Flow at Abercrombie, Wild Rice River

Q^t_{AE} : The combined flow at the Abercrombie, Wild Rice River, and Enloe, Red River

$Q^t_{AE\_MAX}$: The maximum of the combined flow at Abercrombie and Enloe

$Q^t_{DI\_MAX}$: Designed maximum flow through Diversion Inlet Control Structure (Note: $Q^t_{DI\_MAX}$ = 20,000 cfs for flood events less than 200-year i.e., $Q^t_{AE\_MAX}$ = 48,000 cfs, and $Q^t_{DI\_MAX}$ = 25,000 cfs for the flood equal to the 500-year event i.e., $Q^t_{AE\_MAX}$ = 60,000 cfs. For any flood events that are larger than the 200-year and less than the 500-year event, $Q^t_{DI\_MAX}$ can be calculated using linear interpolation method.)

Q^t_{ENLOE} : Flow at Enloe, Red River

Q^t_{FALLING} : Calculated allowable flow for the falling limb of the hydrograph for Operation segment 6

Q^t_{HOLD} : Calculated allowable flow to be hold through the RRCS and WRRCS for Operation segment 3

Q^{t0}_{HOLD} : Calculated maximum flow to be hold through the RRCS and WRRCS for Operation segment 2

$Q^{t-36/\Delta t}_{MAPLE}$: Flow at Durbin, Maple River, 36 hours ago

$Q^t{}_{MAPLE\_REDUC}$: Calculated flow reduction for the Maple River

Q^t_{PMF} : Calculated allowable flow to pass through the town and DICS gates for the PMF operation

$Q^t_{REDUCTION}$: Calculated total flow reduction for the Maple River, Rush River, and Sheyenne River

$Q^t_{REDUCTION\_MAX}$: Calculated maximum total flow reduction for the Maple River, Rush River, and Sheyenne River

Q^t_{RISING} : Calculated designed flow for the rising limb of the hydrograph

Q^t_{RRCS} : Calculated allowable flow through Red River Control Structure

$Q^{to}_{RRCS\_HOLD}$: Calculated maximum flow to be hold through the RRCS for Operation segment 3

$Q^{t-36/\Delta t}_{RUSH}$: Flow at Amenia, Rush River, 36 hours ago

$Q^t{}_{RUSH\_REDUC}$: Calculated flow reduction for the Rush River

Q^t_{SF} : Calculated allowable flow for small flood operation

$Q^{t-36/\Delta t}_{SHEY}$: Flow at Gol Road, Sheyenne River, 36 hours ago

$Q^t{}_{SHEY\_REDUC}$: Calculated flow reduction for the Sheyenne River

Q^t_{TOWN} : The maximum allowable flow to be sent through the town

$Q^t_{TOWN-RECEDING}$: The allowable receding flow to be sent through the town

$Q^t_{\text{TRANSITION}}$: Calculated allowable flow for the transition limb of the hydrograph for Operation segment 5

Q^t_{WRRCS} : Calculated allowable flow though Wild Rice River Control Structure

$Q^{to}_{WRRCS\_HOLD}$: Calculated maximum flow to be hold through the WRRCS for Operation segment 3

R^t_{RRCS} : Splitting ratio for flow releasing through the Red River Control Structure

R^t_{WRRCS} : Splitting ratio for flow releasing through the Wild Rice River Control Structure

t: The number of project operation iteration since operation began (e.g., 1, 2, 3,….)

$T^t_{CURRENT}$: HEC-RAS model simulation time

T^0_{QTOWN} : The HEC-RAS model simulation time as the calculated Q^t_{RISING} exceeds Q^t_{TOWN}

$V^t_{STAGING\_AREA}$: The volume of water stored in the Staging Area at current operation iteration *t*

$\overline{V^t_{STAGING\_AREA}}$: The average volume of water stored in the Staging Area from the recent three operation iterations *t*, *t-1*, and *t-2*

$V^{t-1}_{STAGING\_AREA}$: The volume of water stored in the Staging Area at previous operation iteration *t-1*

$V^{t-2}_{STAGING\_AREA}$: The volume of water stored in the Staging Area at operation iteration *t-2*

$Z^t_{STAGING\_AREA\_RR}$: Current water surface elevation in Staging Area at the Red River, Breck to Wolv, XS 2531315

$Z^{t-1}_{STAGING\_AREA\_RR}$: Water surface elevation in Staging Area at the Red River, Breck to Wolv, XS 2531315 from previous operation iteration *t-1*

$Z^{t-2}_{STAGING\_AREA\_RR}$: Water surface elevation in Staging Area at the Red River, Breck to Wolv, XS 2531315 from the operation iteration *t-2*

$Z^t_{STAGING\_AREA\_WRR}$: Current water surface elevation in Staging Area at the Wild Rice River, DR37 to DIV, XS 64862

$Z^t{}_{\max}$: Maximum water surface elevation in the Staging Area at Wild Rice River, DR37 to DIV, XS 64862 and Red River Breck to Wolv, XS 2531315 up to time *t*

Δt = Number of hours per operation iteration

ΔT_{QTOWN} : Actual duration that the allowable flow, $Q^t{}_{TOWN}$, has been maintained (hr).

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Fargo-Moorhead Diversion Project
Operation Plan (Flowchart A)

Flood larger than 500Yr?

Yes

No

Normal Operation (500 year or smaller)

Normal flood operation (Flow chart B)

Flood larger than IDF?

Yes

No

Next iteration

IDF Operation Flood (greater than 500-year through IDF)

3.1 Record flows from USGS gages Q_{ABER}, Q_{ENLOE}

3.3 Record Staging Area WSEs $Z_{STAGING\_AREA\_WRR}$, $Z_{STAGING\_AREA\_RR}$

3.2 Sum current flows at Abercrombie and Enloe, Q_{AE}

3.5 Record maximum combined Abercrombie and Enloe flow, Q_{AE_MAX}

3.6 Compute design flow through town, Q_{TOWN}

3.4 Compute flow splitting ratios for WRRCS and RRCS, R_{WRRCS}, R_{RRCS}

3.7

$Q_{WRRCS} = R_{WRRCS} \times Q_{TOWN}$

$Q_{RRCS} = R_{RRCS} \times Q_{TOWN}$

3.8

Compute WRRCS gate opening, H_{WRRCS}

Compute RRCS gate opening, H_{RRCS}

DIVCS gate wide open

Next iteration

PMF Operation (greater than IDF)

4.1 Record flows from USGS gages Q_{ABER}, Q_{ENLOE}

4.3 Record Staging Area WSEs $Z_{STAGING\_AREA\_WRR}$ at current iteration, $Z_{STAGING\_AREA\_RR}$ at current iteration and previous two iterations

4.2 Sum current flows at Abercrombie and Enloe, Q_{AE}

4.4 Compute flow splitting ratios for WRRCS and RRCS, R_{WRRCS}, R_{RRCS}

4.5 Staging Area WSEs < Critical elevation?

Yes

No

4.6 Record maximum combined Abercrombie and Enloe flow, Q_{AE_MAX}

4.7 Compute design flow through town, Q_{TOWN}

4.11 Compute volume of water in Staging Area, $V_{STAGING\_AREA}$ at current iteration and previous two iterations

4.12 Compute average volume of water in Staging Area, $V_{STAGING\_AREA}$, from recent three iterations

4.13 Compute available flow to pass through the town and DICS gates, Q_{PMF}

4.8

$Q_{WRRCS} = R_{WRRCS} \times Q_{TOWN}$

$Q_{RRCS} = R_{RRCS} \times Q_{TOWN}$

4.9

Compute WRRCS gate opening, H_{WRRCS}

Compute RRCS gate opening, H_{RRCS}

DIVCS gate wide open

4.10 Record flow passing through DICS from previous iteration, Q_{DICS}

4.14

$Q_{WRRCS} = R_{WRRCS} \times (Q_{PMF} - Q_{DICS})$

$Q_{RRCS} = R_{RRCS} \times (Q_{PMF} - Q_{DICS})$

4.15

Compute WRRCS gate opening, H_{WRRCS}

Compute RRCS gate opening, H_{RRCS}

DIVCS gate wide open

Fargo-Moorhead Diversion Project
Operation Plan (Flowchart B)

Next iteration

2.1.1 Record flows from USGS gages Q_{ABER}, Q_{ENLOE}

2.1.2 Sum current flows at Abercrombie and Enloe, Q_{AE}

2.1.3 Q_{AE} > 17,000 cfs? — Yes / No

2.1.4 No Operation
- WRRCS Open
- RRCS Open
- DICS Closed

2.2.1 Record Staging Area WSEs $Z_{STAGING\_AREA\_WRR}$, $Z_{STAGING\_AREA\_RR}$

2.2.2 Compute WRRCS and RRCS gate flow, Q_{WRRCS_HOLD}, Q_{RRCS_HOLD}

2.2.3 Compute flow to hold through town, Q_{HOLD}

2.2.4 Prepare Gates
- WRRCS: set initial gate height
- RRCS: set initial gate height
- DICS Closed

2.3.1 Record flows from USGS gages Q_{ABER}, Q_{ENLOE}, Q_{SHEY}, Q_{MAPLE}, Q_{RUSH}

2.3.2 Record Staging Area WSEs $Z_{STAGING\_AREA\_WRR}$, $Z_{STAGING\_AREA\_RR}$

2.3.3 Sum current flows at Abercrombie and Enloe, Q_{AE}

2.3.4 Compute flow splitting ratios for WRRCS and RRCS, R_{WRRCS}, R_{RRCS}

2.3.5 Record maximum combined Abercrombie and Enloe flow, Q_{AE_MAX}

2.3.6 Compute flow reduction for tributary rivers, Q_{SHEY_REDUC}, Q_{MAPLE_REDUC}, Q_{RUSH_REDUC}

2.3.7 Compute total flow reduction, $Q_{REDUCTION}$

2.3.8 Record maximum flow reduction $Q_{REDUCTION\_MAX}$

2.3.9 Compute **a**

2.3.10 Compute volume of water in Staging Area, $V_{STAGING\_AREA}$

2.3.11 Compute Q_{RISING}

2.3.12 Record/ compute Q_{WRRCS}, Q_{RRCS}, Q_{HOLD}

2.3.13 $Q_{RISING} > Q_{HOLD}$? — Yes / No

2.3.14
- Compute WRRCS gate opening, H_{WRRCS}
- Compute RRCS gate opening, H_{RRCS}
- DICS Closed

2.4.1 Record flows from USGS gages Q_{ABER}, Q_{ENLOE}

2.4.2 Record Staging Area WSEs $Z_{STAGING\_AREA\_WRR}$, $Z_{STAGING\_AREA\_RR}$

2.4.3 Sum current flows at Abercrombie and Enloe, Q_{AE}

2.4.4 Compute flow splitting ratios for WRRCS and RRCS, R_{WRRCS}, R_{RRCS}

2.4.5 Has Q_{AE} crested ? — Yes / No

2.4.6 Record maximum combined Abercrombie and Enloe flow, Q_{AE_MAX}

2.4.7 Compute design flow through town, Q_{TOWN}

2.4.8 Q_{AE_MAX} > 22,000 cfs? — Yes / No

2.4.9 1997-type long duration flood? — Yes / No

Small flood

2.4.10 Calculate allowable flow, Q_{SF}

2.4.11
- $Q_{WRRCS} = R_{WRRCS} \times Q_{SF}$
- $Q_{RRCS} = R_{RRCS} \times Q_{SF}$
- DICS Closed

2.4.12
- Compute WRRCS gate opening, H_{WRRCS}
- Compute RRCS gate opening, H_{RRCS}
- DICS Closed

2.4.13 Continue small flood operation ? — Yes / No

End of small flood operation

2.4.14 Has Staging Area WSE crested? — Yes / No

2.4.15 Record flows from USGS gages Q_{MAPLE}, Q_{SHEY}, Q_{RUSH}; Obtain Q_{ABER}, Q_{ENLOE} from 4.1

2.4.16 Obtain combined flow at Abercrombie and Enloe, Q_{AE}, from 4.3

2.4.17 Record maximum combined Abercrombie and Enloe flow, Q_{AE_MAX}

2.4.18 Compute flow reduction for tributary rivers, Q_{SHEY_REDUC}, Q_{MAPLE_REDUC}, Q_{RUSH_REDUC}

2.4.19 Compute total flow reduction, $Q_{REDUCTION}$

2.4.20 Record maximum flow reduction $Q_{REDUCTION\_MAX}$

2.4.21 Compute **a**

2.4.22 Compute volume of water in Staging Area, $V_{STAGING\_AREA}$

2.4.23 Compute Q_{RISING}

2.4.24 Compute design flow through town, Q_{TOWN}

2.4.25 $Q_{RISING} > Q_{TOWN}$? — No Use Q_{RISING} / Yes Use Q_{TOWN}

2.4.26
- $Q_{WRRCS} = R_{WRRCS} \times Q_{RISING}$
- $Q_{RRCS} = R_{RRCS} \times Q_{RISING}$
- DICS Closed

2.4.27 Record time when $Q_{RISING} > Q_{TOWN}$, T^{0}_{QTOWN}

2.4.28
- $Q_{WRRCS} = R_{WRRCS} \times Q_{TOWN}$
- $Q_{RRCS} = R_{RRCS} \times Q_{TOWN}$
- $Q_{DICS} = Q_{RISING} - Q_{TOWN}$

2.4.29
- Compute WRRCS gate opening, H_{WRRCS}
- Compute RRCS gate opening, H_{RRCS}
- Compute DICS gate opening, H_{DICS}

2.5.1 Record Staging Area WSEs $Z_{STAGING\_AREA\_WRR}$, $Z_{STAGING\_AREA\_RR}$

2.5.2 Record flows from USGS gages Q_{ABER}, Q_{ENLOE}, Q_{SHEY}, Q_{MAPLE}, Q_{RUSH}

2.5.3 Sum current flows at Abercrombie and Enloe, Q_{AE}

2.5.4 Compute flow splitting ratios for WRRCS and RRCS, R_{WRRCS}, R_{RRCS}

2.5.5 Record maximum combined Abercrombie and Enloe flow, Q_{AE_MAX}

2.5.6 Compute flow reduction for tributary rivers, Q_{SHEY_REDUC}, Q_{MAPLE_REDUC}, Q_{RUSH_REDUC}

2.5.7 Compute total flow reduction, $Q_{REDUCTION}$

2.5.8 Record maximum flow reduction $Q_{REDUCTION\_MAX}$

2.5.9 Compute **b**

2.5.10 Compute volume of water in Staging Area, $V_{STAGING\_AREA}$

2.5.11 Compute $Q_{TRANSITION}$

2.5.12 Compute **c**

2.5.13 Compute $Q_{FALLING}$

2.5.14 $Q_{TRANSITION} > Q_{FALLING}$? — Yes / No

2.5.15 Record Q_{DICS} from a previous operation iteration

2.5.16 Compute design flow through town, Q_{TOWN}

2.5.17 Compute DT_{QTOWN}?

2.5.18 Compute ΔT_{QTOWN}

2.5.19 $\Delta T_{QTOWN} > DT_{QTOWN}$? — Yes / No Use Q_{TOWN}

2.5.20
- $Q_{WRRCS} = R_{WRRCS} \times Q_{TOWN}$
- $Q_{RRCS} = R_{RRCS} \times Q_{TOWN}$
- $Q_{DICS} = Q_{TRANSITION} - Q_{TOWN}$

2.5.21 Compute designed flow through town, $Q_{TOWN\text{-}RECEDING}$

Use $Q_{TOWN\text{-}RECEDING}$

2.5.22
- $Q_{WRRCS} = R_{WRRCS} \times Q_{TOWN\text{-}RECEDING}$
- $Q_{RRCS} = R_{RRCS} \times Q_{TOWN\text{-}RECEDING}$
- $Q_{DICS} = Q_{TRANSITION} - Q_{TOWN\text{-}RECEDING}$

2.5.23
- Compute WRRCS gate opening, H_{WRRCS}
- Compute RRCS gate opening, H_{RRCS}
- Compute DICS gate opening, H_{DICS}

2.6.1 Record flows from USGS gages Q_{ABER}, Q_{ENLOE}

2.6.2 Record Staging Area WSEs $Z_{STAGING\_AREA\_WRR}$, $Z_{STAGING\_AREA\_RR}$

2.6.3 Sum current flows at Abercrombie and Enloe, Q_{AE}

2.6.4 Compute flow splitting ratios for WRRCS and RRCS, R_{WRRCS}, R_{RRCS}

2.6.5 Compute ΔT_{QTOWN}

2.6.6 $\Delta T_{QTOWN} > DT_{QTOWN}$? — Yes / No Use Q_{TOWN}

2.6.7
- $Q_{WRRCS} = R_{WRRCS} \times Q_{TOWN}$
- $Q_{RRCS} = R_{RRCS} \times Q_{TOWN}$

2.6.8 Compute design flow through town, $Q_{TOWN\text{-}RECEDING}$

Use $Q_{TOWN\text{-}RECEDING}$

2.6.9
- $Q_{WRRCS} = R_{WRRCS} \times Q_{TOWN\text{-}RECEDING}$
- $Q_{RRCS} = R_{RRCS} \times Q_{TOWN\text{-}RECEDING}$

2.6.10 Compute allowable flow to pass the DICS, Q_{DICS}

2.6.11
- Compute RRCS gate opening, H_{DICS}
- Compute WRRCS gate opening, H_{WRRCS}
- Compute RRCS gate opening, H_{RRCS}

2.6.12 Continue flood operation ? — No / Yes

End of flood operation

Operation Segment 1 No Operation

Operation Segment 2 Gate Preparation

Operation Segment 3 Hold

Operation Segment 4 Rising

Operation Segment 5 Transition

Operation Segment 6 Falling

Fargo-Moorhead Diversion Project
Operation Plan (Flowchart C)

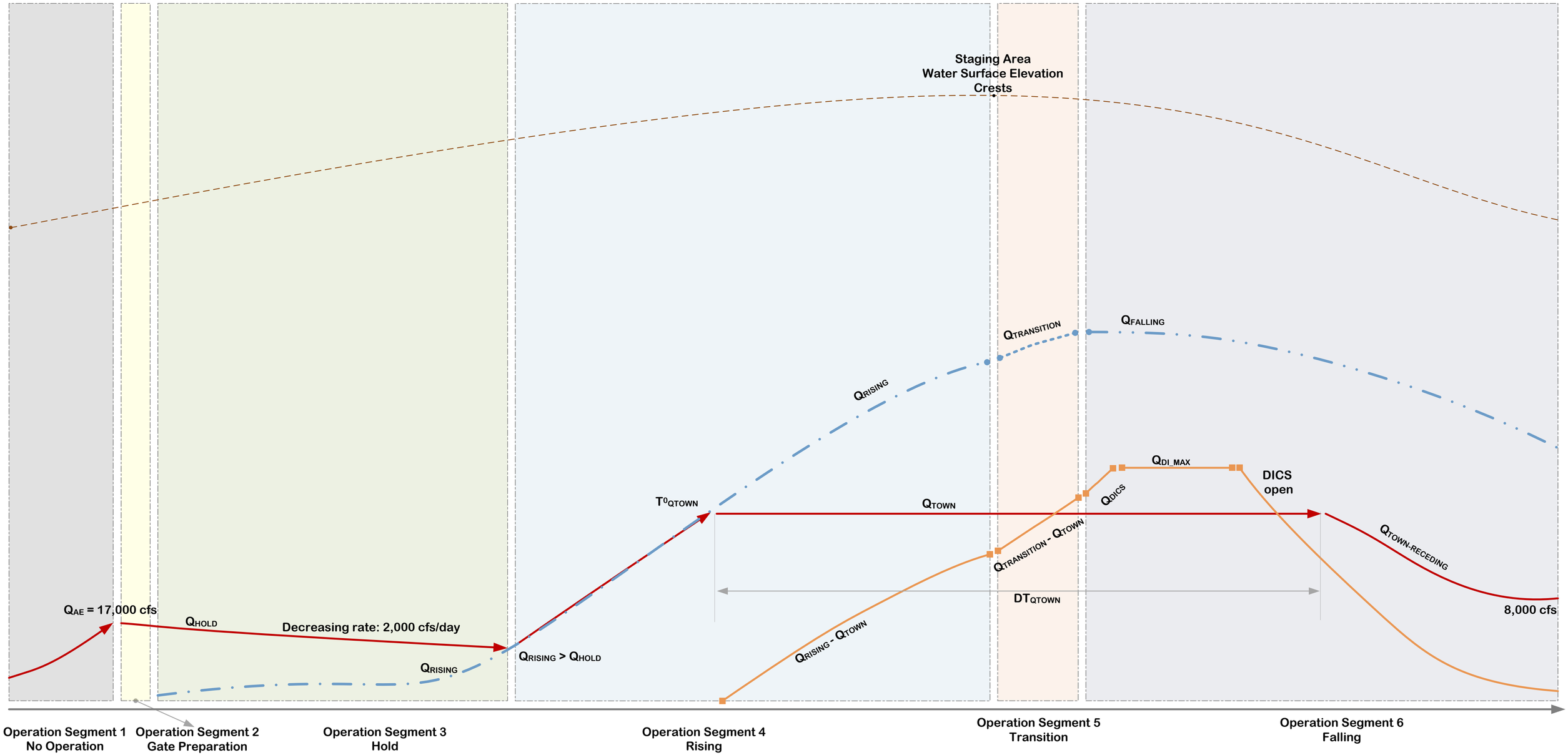

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Table 1 Wild Rice River Control Structure (WRRCS) Flow-Stage Relationship (Gate Open)

Staging Area Elevation at Wild Rice Rive, $Z_{STAGING-AREA-WRR}$ (ft)	Flow at WRRCS, Q_{WRRCS} (cfs)	Staging Area Elevation at Wild Rice Rive, $Z_{STAGING-AREA-WRR}$ (ft)	Flow at WRRCS, Q_{WRRCS} (cfs)
900.4	1,403	913.4	9,105
900.6	1,455	913.6	9,234
900.8	1,506	913.8	9,387
901.0	1,557	914.0	9,589
901.2	1,609	914.2	9,869
901.4	1,660	914.4	10,114
901.6	1,712	914.6	10,346
901.8	1,763	914.8	10,583
902.0	1,815	915.0	10,898
902.2	1,866	915.2	11,189
902.4	1,918	915.4	11,671
902.6	1,969	915.6	12,393
902.8	2,021	915.8	13,288
903.0	2,072	916.0	14,344
903.2	2,124	916.2	15,562
903.4	2,175	916.4	16,957
903.6	2,239	916.6	18,541
903.8	2,312	916.8	20,129
904.0	2,386	917.0	21,729
904.2	2,459	917.2	23,458
904.4	2,532	917.4	25,322
904.6	2,605	917.6	27,171
904.8	2,678	917.8	29,109
905.0	2,753	918.0	31,112
905.2	2,835	918.2	32,938
905.4	2,916	918.4	34,708
905.6	2,997	918.6	36,499
905.8	3,081	918.8	37,947
906.0	3,186	919.0	39,320
906.2	3,291	919.2	40,359
906.4	3,395	919.4	40,361
906.6	3,511	919.6	40,363
906.8	3,640	919.8	40,365
907.0	3,770	920.0	40,367
907.2	3,900	920.2	40,369
907.4	4,029	920.4	40,371
907.6	4,206	920.6	40,373
907.8	4,392	920.8	40,375
908.0	4,579	921.0	40,377
908.2	4,766	921.2	40,379
908.4	4,953	921.4	40,381
908.6	5,139	921.6	40,383
908.8	5,326	921.8	40,385
909.0	5,513	922.0	40,387
909.2	5,700	922.2	40,389
909.4	5,886	922.4	40,391
909.6	6,073	922.6	40,393
909.8	6,235	922.8	40,395
910.0	6,396	923.0	40,397
910.2	6,558	923.2	40,399
910.4	6,719	923.4	40,401
910.6	6,880	923.6	40,403
910.8	7,042	923.8	40,405
911.0	7,203	924.0	40,407
911.2	7,364	924.2	40,409
911.4	7,526	924.4	40,411
911.6	7,687	924.6	40,413
911.8	7,831	924.8	40,415
912.0	7,948	925.0	40,417
912.2	8,065	925.2	40,419
912.4	8,181	925.4	40,421
912.6	8,336	925.6	40,423
912.8	8,511	925.8	40,425
913.0	8,699	926.0	40,427
913.2	8,927		

Table 2 Red River Control Structure (RRCS) Flow-Stage Relationship (Gate Open)

Staging Area Elevation at Red River, $Z_{STAGING-AREA-RR}$(ft)	Flow at RRCS, Q_{RRCS} (cfs)	Staging Area Elevation at Red River, $Z_{STAGING-AREA-RR}$(ft)	Flow at RRCS, Q_{RRCS} (cfs)
891.2	1,268	905.8	8,438
891.4	1,313	906.0	8,607
891.6	1,383	906.2	8,786
891.8	1,454	906.4	8,936
892.0	1,527	906.6	9,114
892.2	1,596	906.8	9,287
892.4	1,662	907.0	9,448
892.6	1,728	907.2	9,659
892.8	1,792	907.4	9,864
893.0	1,856	907.6	10,067
893.2	1,919	907.8	10,263
893.4	1,983	908.0	10,462
893.6	2,047	908.2	10,663
893.8	2,113	908.4	10,866
894.0	2,179	908.6	11,082
894.2	2,246	908.8	11,303
894.4	2,312	909.0	11,525
894.6	2,377	909.2	11,755
894.8	2,443	909.4	11,995
895.0	2,510	909.6	12,245
895.2	2,578	909.8	12,508
895.4	2,648	910.0	12,847
895.6	2,719	910.2	13,274
895.8	2,788	910.4	13,782
896.0	2,858	910.6	14,271
896.2	2,927	910.8	14,709
896.4	3,005	911.0	15,127
896.6	3,085	911.2	15,521
896.8	3,163	911.4	15,892
897.0	3,242	911.6	16,234
897.2	3,322	911.8	16,607
897.4	3,403	912.0	16,978
897.6	3,487	912.2	17,352
897.8	3,579	912.4	17,714
898.0	3,671	912.6	18,095
898.2	3,761	912.8	18,490
898.4	3,853	913.0	18,906
898.6	3,944	913.2	19,357
898.8	4,039	913.4	19,773
899.0	4,136	913.6	20,327
899.2	4,231	913.8	20,964
899.4	4,320	914.0	21,826
899.6	4,397	914.2	23,157
899.8	4,472	914.4	24,441
900.0	4,545	914.6	25,873
900.2	4,612	914.8	26,972
900.4	4,675	915.0	28,167
900.6	4,775	915.2	29,436
900.8	4,894	915.4	30,698
901.0	5,017	915.6	32,016
901.2	5,141	915.8	33,496
901.4	5,273	916.0	35,146
901.6	5,403	916.2	37,001
901.8	5,532	916.4	39,016
902.0	5,660	916.6	40,711
902.2	5,784	916.8	40,731
902.4	5,908	917.0	40,751
902.6	6,038	917.2	40,771
902.8	6,168	917.4	40,791
903.0	6,304	917.6	40,811
903.2	6,445	917.8	40,831
903.4	6,594	918.0	40,851
903.6	6,743	918.2	40,871
903.8	6,876	918.4	40,891
904.0	7,015	918.6	40,911
904.2	7,162	918.8	40,931
904.4	7,319	919.0	40,951
904.6	7,474	919.2	40,971
904.8	7,633	919.4	40,991
905.0	7,793	919.6	41,011
905.2	7,950	919.8	41,031
905.4	8,107	920.0	41,051
905.6	8,274	920.2	41,071

Table 3 Coefficient *a* [-] for the Nonlinear Reservoir Model (Rising Segment)

Maximum flow from combined Enloe and Abercrombie $Q^{t}_{AE\text{-}MAX}$ (cfs)	Maximum flow reduction, $Q^{t}_{REDUCTION\text{-}MAX}$ (cfs)																	
	0	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	5,000	6,000	7,000	8,000	9,000	10,000	15,000	20,000	50,000
20,000	0.0043	0.0043	0.0044	0.0045	0.0045	0.0046	0.0046	0.0046	0.0047	0.0047	0.0047	0.0048	0.0048	0.0048	0.0049	0.0054	0.0060	0.0065
21,000	0.0042	0.0043	0.0044	0.0045	0.0045	0.0045	0.0046	0.0046	0.0046	0.0047	0.0047	0.0047	0.0048	0.0048	0.0048	0.0053	0.0060	0.0064
22,000	0.0042	0.0043	0.0044	0.0044	0.0045	0.0045	0.0045	0.0046	0.0046	0.0046	0.0047	0.0047	0.0047	0.0048	0.0048	0.0053	0.0059	0.0064
23,000	0.0042	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045	0.0046	0.0046	0.0046	0.0047	0.0047	0.0047	0.0047	0.0048	0.0053	0.0059	0.0064
24,000	0.0042	0.0043	0.0043	0.0044	0.0044	0.0045	0.0045	0.0045	0.0046	0.0046	0.0046	0.0047	0.0047	0.0047	0.0048	0.0052	0.0059	0.0063
25,000	0.0041	0.0042	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045	0.0045	0.0046	0.0046	0.0046	0.0047	0.0047	0.0047	0.0052	0.0059	0.0063
26,000	0.0041	0.0042	0.0043	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045	0.0045	0.0046	0.0046	0.0046	0.0047	0.0047	0.0052	0.0058	0.0062
27,000	0.0041	0.0042	0.0042	0.0043	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045	0.0045	0.0046	0.0046	0.0046	0.0046	0.0051	0.0057	0.0062
28,000	0.0040	0.0041	0.0042	0.0042	0.0043	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045	0.0045	0.0045	0.0046	0.0046	0.0051	0.0057	0.0061
29,000	0.0040	0.0041	0.0042	0.0042	0.0042	0.0043	0.0043	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045	0.0045	0.0046	0.0050	0.0056	0.0061
30,000	0.0040	0.0040	0.0041	0.0042	0.0042	0.0042	0.0043	0.0043	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045	0.0045	0.0050	0.0056	0.0060
31,000	0.0039	0.0040	0.0041	0.0041	0.0042	0.0042	0.0042	0.0043	0.0043	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045	0.0050	0.0056	0.0060
32,000	0.0039	0.0040	0.0041	0.0041	0.0041	0.0042	0.0042	0.0042	0.0043	0.0043	0.0043	0.0044	0.0044	0.0044	0.0045	0.0049	0.0055	0.0059
33,000	0.0039	0.0040	0.0040	0.0041	0.0041	0.0041	0.0042	0.0042	0.0043	0.0043	0.0043	0.0043	0.0044	0.0044	0.0044	0.0049	0.0055	0.0059
34,000	0.0038	0.0039	0.0040	0.0040	0.0041	0.0041	0.0042	0.0042	0.0042	0.0042	0.0043	0.0043	0.0043	0.0044	0.0044	0.0048	0.0054	0.0059
35,000	0.0038	0.0039	0.0040	0.0040	0.0041	0.0041	0.0041	0.0042	0.0042	0.0042	0.0042	0.0043	0.0043	0.0043	0.0044	0.0048	0.0054	0.0058
36,000	0.0038	0.0039	0.0040	0.0040	0.0040	0.0041	0.0041	0.0041	0.0042	0.0042	0.0042	0.0042	0.0043	0.0043	0.0043	0.0048	0.0054	0.0058
37,000	0.0038	0.0038	0.0039	0.0040	0.0040	0.0040	0.0041	0.0041	0.0041	0.0042	0.0042	0.0042	0.0042	0.0043	0.0043	0.0047	0.0053	0.0057
38,000	0.0037	0.0038	0.0039	0.0039	0.0040	0.0040	0.0040	0.0041	0.0041	0.0041	0.0042	0.0042	0.0042	0.0042	0.0043	0.0047	0.0053	0.0057
39,000	0.0037	0.0038	0.0039	0.0039	0.0039	0.0040	0.0040	0.0040	0.0041	0.0041	0.0041	0.0042	0.0042	0.0042	0.0042	0.0047	0.0052	0.0056
40,000	0.0037	0.0038	0.0038	0.0039	0.0039	0.0039	0.0040	0.0040	0.0040	0.0041	0.0041	0.0041	0.0041	0.0042	0.0042	0.0046	0.0052	0.0056
41,000	0.0036	0.0037	0.0038	0.0038	0.0038	0.0039	0.0039	0.0039	0.0040	0.0040	0.0040	0.0041	0.0041	0.0041	0.0041	0.0046	0.0051	0.0055
42,000	0.0036	0.0036	0.0037	0.0037	0.0038	0.0038	0.0038	0.0039	0.0039	0.0039	0.0040	0.0040	0.0040	0.0040	0.0041	0.0045	0.0050	0.0054
43,000	0.0035	0.0036	0.0036	0.0037	0.0037	0.0037	0.0038	0.0038	0.0038	0.0039	0.0039	0.0039	0.0039	0.0040	0.0040	0.0044	0.0049	0.0053
44,000	0.0036	0.0037	0.0038	0.0038	0.0038	0.0039	0.0039	0.0039	0.0040	0.0040	0.0040	0.0040	0.0041	0.0041	0.0041	0.0045	0.0051	0.0055
45,000	0.0037	0.0038	0.0039	0.0039	0.0039	0.0040	0.0040	0.0040	0.0041	0.0041	0.0041	0.0042	0.0042	0.0042	0.0042	0.0047	0.0053	0.0057
46,000	0.0038	0.0039	0.0040	0.0040	0.0041	0.0041	0.0041	0.0042	0.0042	0.0042	0.0043	0.0043	0.0043	0.0043	0.0044	0.0048	0.0054	0.0058
47,000	0.0039	0.0040	0.0041	0.0041	0.0042	0.0042	0.0043	0.0043	0.0043	0.0044	0.0044	0.0044	0.0044	0.0045	0.0045	0.0050	0.0056	0.0060
48,000	0.0040	0.0041	0.0042	0.0043	0.0043	0.0043	0.0044	0.0044	0.0044	0.0045	0.0045	0.0045	0.0046	0.0046	0.0046	0.0051	0.0057	0.0062
49,000	0.0042	0.0043	0.0044	0.0044	0.0045	0.0045	0.0046	0.0046	0.0046	0.0047	0.0047	0.0047	0.0048	0.0048	0.0048	0.0053	0.0060	0.0064
50,000	0.0044	0.0045	0.0046	0.0046	0.0047	0.0047	0.0047	0.0048	0.0048	0.0048	0.0049	0.0049	0.0049	0.0050	0.0050	0.0055	0.0062	0.0067
51,000	0.0046	0.0047	0.0048	0.0048	0.0048	0.0049	0.0049	0.0050	0.0050	0.0050	0.0051	0.0051	0.0051	0.0052	0.0052	0.0057	0.0064	0.0069
52,000	0.0047	0.0048	0.0049	0.0050	0.0050	0.0051	0.0051	0.0051	0.0052	0.0052	0.0053	0.0053	0.0053	0.0054	0.0054	0.0060	0.0067	0.0072
53,000	0.0049	0.0050	0.0051	0.0051	0.0052	0.0052	0.0053	0.0053	0.0054	0.0054	0.0054	0.0055	0.0055	0.0055	0.0056	0.0062	0.0069	0.0074
54,000	0.0051	0.0052	0.0053	0.0053	0.0054	0.0054	0.0055	0.0055	0.0056	0.0056	0.0056	0.0057	0.0057	0.0057	0.0058	0.0064	0.0072	0.0077
55,000	0.0052	0.0053	0.0055	0.0055	0.0056	0.0056	0.0056	0.0057	0.0057	0.0058	0.0058	0.0059	0.0059	0.0059	0.0060	0.0066	0.0074	0.0080
56,000	0.0054	0.0055	0.0056	0.0057	0.0057	0.0058	0.0058	0.0059	0.0059	0.0060	0.0060	0.0060	0.0061	0.0061	0.0062	0.0068	0.0076	0.0082
57,000	0.0056	0.0057	0.0058	0.0059	0.0059	0.0060	0.0060	0.0061	0.0061	0.0062	0.0062	0.0062	0.0063	0.0063	0.0064	0.0070	0.0079	0.0085
58,000	0.0057	0.0059	0.0060	0.0060	0.0061	0.0061	0.0062	0.0062	0.0063	0.0063	0.0064	0.0064	0.0065	0.0065	0.0065	0.0072	0.0081	0.0087
59,000	0.0059	0.0060	0.0062	0.0062	0.0063	0.0063	0.0064	0.0064	0.0065	0.0065	0.0066	0.0066	0.0067	0.0067	0.0067	0.0074	0.0083	0.0090
60,000	0.0061	0.0062	0.0063	0.0064	0.0064	0.0065	0.0066	0.0066	0.0067	0.0067	0.0068	0.0068	0.0068	0.0069	0.0069	0.0077	0.0086	0.0092
65,000	0.0065	0.0067	0.0068	0.0069	0.0069	0.0070	0.0071	0.0071	0.0072	0.0072	0.0073	0.0073	0.0074	0.0074	0.0075	0.0082	0.0092	0.0099
70,000	0.0070	0.0071	0.0073	0.0074	0.0074	0.0075	0.0075	0.0076	0.0077	0.0077	0.0078	0.0078	0.0079	0.0079	0.0080	0.0088	0.0099	0.0106

Table 4 Stage-Volume Relationship of Staging Area

Water Surface Elevation at Red River, $Z_{STAGING-AREA-RR}$ (ft)	Volume of water in Staging Area (Ac-ft)	Water Surface Elevation at Red River, $Z_{STAGING-AREA-RR}$ (ft)	Volume of water in Staging Area (Ac-ft)
887	0	911	27,290
887.5	1	911.5	30,016
888	6	912	33,179
888.5	20	912.5	36,858
889	42	913	41,029
889.5	72	913.5	45,722
890	111	914	50,956
890.5	157	914.5	56,740
891	210	915	63,119
891.5	271	915.5	70,137
892	343	916	77,810
892.5	432	916.5	86,202
893	534	917	95,277
893.5	651	917.5	105,009
894	784	918	115,437
894.5	932	918.5	126,567
895	1,099	919	138,433
895.5	1,286	919.5	151,018
896	1,498	920	164,371
896.5	1,736	920.5	178,557
897	1,999	921	193,566
897.5	2,286	921.5	209,553
898	2,596	922	226,687
898.5	2,930	922.5	245,031
899	3,287	923	264,738
899.5	3,669	923.5	285,908
900	4,077	924	308,496
900.5	4,517	924.5	332,538
901	4,996	925	358,020
901.5	5,513	925.5	385,005
902	6,070	926	413,489
902.5	6,665	926.5	443,349
903	7,303	927	474,428
903.5	7,986	927.5	506,660
904	8,715	928	540,128
904.5	9,492	928.5	574,978
905	10,319	929	611,194
905.5	11,199	929.5	649,011
906	12,135	930	688,497
906.5	13,130	930.5	729,538
907	14,194	931	772,007
907.5	15,337	931.5	815,674
908	16,576	932	860,418
908.5	17,929	932.5	906,131
909	19,411	933	952,781
909.5	21,043	933.5	1,000,341
910	22,864	934	1,048,739
910.5	24,928	934.5	1,097,939
		935	1,147,955

Table 5 Wild Rice River Control Structure (WRRCS) Gate Opening (ft) - Part A

Flow through WRRCS (cfs)	Staging Area Elevation at Wild Rice River, $Z_{STAGING-AREA-WRR}$ (ft)																																			
	900.4	900.6	900.8	901.0	901.2	901.4	901.6	901.8	902.0	902.2	902.4	902.6	902.8	903.0	903.2	903.4	903.6	903.8	904.0	904.2	904.4	904.6	904.8	905.0	905.2	905.4	905.6	905.8	906.0	906.2	906.4	906.6	906.8	907.0	907.2	907.4	907.6
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.52	0.50	0.48	0.47	0.45	0.44	0.43	0.42	0.41	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
800	0.20	0.20	0.20	0.20	0.20	0.20	0.73	0.69	0.64	0.60	0.58	0.56	0.54	0.52	0.51	0.50	0.48	0.47	0.46	0.45	0.45	0.44	0.43	0.42	0.42	0.41	0.41	0.40	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
900	0.20	0.20	0.20	0.20	0.20	1.04	0.97	0.91	0.85	0.79	0.75	0.71	0.67	0.63	0.60	0.58	0.56	0.55	0.54	0.52	0.51	0.50	0.49	0.49	0.48	0.47	0.46	0.46	0.45	0.45	0.45	0.44	0.44	0.44	0.43	0.43	0.43
1,000	0.20	0.20	0.20	0.20	1.37	1.31	1.25	1.18	1.10	1.03	0.97	0.91	0.85	0.80	0.76	0.72	0.69	0.65	0.62	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.51	0.50	0.50	0.49	0.49	0.49	0.48	0.48	0.48
1,100	0.20	0.20	0.20	1.73	1.65	1.57	1.49	1.42	1.36	1.29	1.23	1.16	1.09	1.02	0.96	0.91	0.86	0.81	0.77	0.74	0.71	0.67	0.64	0.61	0.59	0.58	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.53	0.53	0.53	0.52
1,200	0.20	0.20	2.25	2.11	1.99	1.90	1.81	1.73	1.64	1.56	1.48	1.41	1.34	1.28	1.21	1.14	1.08	1.01	0.96	0.91	0.87	0.82	0.78	0.75	0.72	0.69	0.67	0.65	0.64	0.62	0.61	0.60	0.59	0.58	0.58	0.57	0.57
1,300	0.20	3.17	2.86	2.63	2.45	2.30	2.17	2.06	1.97	1.88	1.81	1.72	1.63	1.55	1.47	1.39	1.33	1.26	1.19	1.13	1.07	1.01	0.96	0.92	0.87	0.84	0.80	0.78	0.76	0.73	0.72	0.70	0.68	0.67	0.65	0.64	0.63
1,400	5.80	4.56	3.87	3.41	3.09	2.83	2.64	2.47	2.34	2.22	2.12	2.02	1.94	1.87	1.80	1.72	1.63	1.54	1.46	1.38	1.31	1.24	1.17	1.12	1.06	1.02	0.98	0.94	0.90	0.87	0.84	0.81	0.78	0.76	0.74	0.73	0.71
1,500	36.00	36.00	6.06	4.82	4.12	3.64	3.29	3.03	2.81	2.64	2.49	2.37	2.26	2.16	2.07	1.99	1.93	1.86	1.80	1.71	1.62	1.53	1.45	1.37	1.30	1.24	1.18	1.13	1.09	1.04	1.00	0.96	0.93	0.89	0.86	0.83	0.80
1,600	36.00	36.00	36.00	36.00	6.28	5.05	4.34	3.85	3.49	3.21	2.98	2.80	2.65	2.51	2.39	2.29	2.20	2.12	2.04	1.97	1.91	1.85	1.79	1.69	1.60	1.51	1.43	1.37	1.30	1.25	1.19	1.15	1.10	1.05	1.01	0.97	0.93
1,700	36.00	36.00	36.00	36.00	36.00	36.00	6.46	5.25	4.53	4.04	3.67	3.38	3.14	2.95	2.79	2.65	2.53	2.42	2.32	2.23	2.16	2.09	2.03	1.97	1.90	1.83	1.74	1.65	1.57	1.49	1.43	1.36	1.30	1.23	1.18	1.13	1.08
1,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	6.61	5.44	4.71	4.21	3.83	3.54	3.30	3.09	2.92	2.78	2.65	2.54	2.44	2.35	2.28	2.20	2.14	2.08	2.03	1.97	1.88	1.79	1.70	1.61	1.52	1.44	1.37	1.31	1.25
1,900	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	6.76	5.60	4.88	4.37	3.99	3.69	3.44	3.23	3.05	2.90	2.77	2.66	2.56	2.47	2.39	2.31	2.25	2.19	2.13	2.08	2.02	1.90	1.78	1.69	1.60	1.52	1.45
2,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	9.45	6.89	5.75	5.03	4.52	4.13	3.82	3.56	3.34	3.16	3.01	2.88	2.76	2.66	2.57	2.49	2.41	2.35	2.28	2.22	2.15	2.07	1.97	1.86	1.76	1.66
2,100	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	9.14	7.00	5.88	5.17	4.62	4.20	3.89	3.63	3.43	3.25	3.11	2.98	2.86	2.76	2.67	2.58	2.50	2.42	2.36	2.29	2.23	2.16	2.03	1.89
2,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	9.04	6.91	5.77	5.07	4.58	4.22	3.93	3.69	3.50	3.33	3.19	3.07	2.95	2.84	2.74	2.65	2.56	2.49	2.42	2.35	2.27	2.16
2,300	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	7.82	6.39	5.55	4.98	4.56	4.23	3.96	3.74	3.56	3.40	3.26	3.12	3.00	2.89	2.79	2.70	2.62	2.54	2.46	2.37
2,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	8.89	7.08	6.06	5.39	4.91	4.54	4.24	3.99	3.78	3.59	3.43	3.28	3.15	3.04	2.93	2.83	2.74	2.65	2.57
2,500	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	7.83	6.60	5.82	5.26	4.85	4.51	4.22	3.98	3.78	3.60	3.45	3.31	3.18	3.06	2.95	2.85	2.76
2,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	8.69	7.19	6.28	5.63	5.14	4.76	4.45	4.19	3.97	3.78	3.61	3.45	3.31	3.18	3.07	2.96
2,700	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	9.68	7.83	6.71	5.97	5.42	5.00	4.67	4.39	4.15	3.93	3.74	3.57	3.43	3.30	3.18
2,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	8.38	7.12	6.30	5.71	5.26	4.90	4.57	4.30	4.07	3.87	3.70	3.54	3.41
2,900	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	8.97	7.55	6.64	6.00	5.47	5.05	4.72	4.43	4.20	3.99	3.81	3.66
3,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	9.59	7.99	6.93	6.18	5.63	5.20	4.85	4.57	4.32	4.11	3.93
3,100	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	8.21	7.09	6.34	5.77	5.34	4.99	4.69	4.43	4.22
3,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	8.35	7.24	6.48	5.92	5.47	5.09	4.79	4.53
3,300	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	8.48	7.39	6.61	6.01	5.55	5.18	4.88
3,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	8.58	7.43	6.65	6.08	5.63	5.27
3,500	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	10.17	8.47	7.42	6.69	6.13	5.70
3,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	9.88	8.38	7.41	6.72	6.19
3,700	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	9.64	8.30	7.41	6.75
3,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	9.45	8.23	7.40
3,900	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	9.28	8.17
4,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	10.68	9.06
4,100	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	10.11
4,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	11.43
4,300	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
4,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
4,500	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
4,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
4,700	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
4,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
4,900	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
5,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
5,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
5,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
5,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
5,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
6,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
6,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
6,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
6,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
6,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
7,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
7,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
7,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
7,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
7,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
8,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
8,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
8,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
8,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
8,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
9,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
9,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
9,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
9,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
9,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
10,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
10,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
10,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
10,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
10,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
11,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
11,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
11,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
11,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
11,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
30,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00

Table 5 Wild Rice River Control Structure (WRRCS) Gate Opening (ft) - Part B

Flow through WRRCS (cfs)	Staging Area Elevation at Wild Rice River, $Z_{STAGING-AREA-WRR}$ (ft)																																			
	907.8	908.0	908.2	908.4	908.6	908.8	909.0	909.2	909.4	909.6	909.8	910.0	910.2	910.4	910.6	910.8	911.0	911.2	911.4	911.6	911.8	912.0	912.2	912.4	912.6	912.8	913.0	913.2	913.4	913.6	913.8	914.0	914.2	914.4	914.6	914.8	915.0
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.24
700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28
800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.36	0.36	0.36	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.32	0.32	0.32	0.32	0.32	0.32
900	0.43	0.42	0.42	0.42	0.42	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.40	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.36	0.36
1,000	0.47	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.44	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.40	0.40
1,100	0.52	0.52	0.51	0.51	0.51	0.51	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.45	0.44	0.44	0.44	0.44	0.44
1,200	0.57	0.56	0.56	0.56	0.56	0.55	0.55	0.55	0.54	0.54	0.54	0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.51	0.51	0.51	0.51	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.48	0.48	0.48	0.48	0.48
1,300	0.63	0.62	0.61	0.61	0.60	0.60	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.55	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52
1,400	0.70	0.69	0.68	0.67	0.66	0.65	0.65	0.64	0.63	0.63	0.63	0.62	0.62	0.62	0.61	0.61	0.61	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.57	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.55
1,500	0.78	0.76	0.75	0.73	0.72	0.71	0.70	0.69	0.68	0.68	0.67	0.67	0.67	0.66	0.66	0.65	0.65	0.65	0.65	0.64	0.64	0.64	0.63	0.63	0.63	0.62	0.62	0.62	0.62	0.61	0.61	0.61	0.60	0.60	0.60	0.60	0.59
1,600	0.90	0.87	0.83	0.80	0.78	0.76	0.75	0.74	0.73	0.72	0.72	0.71	0.71	0.71	0.70	0.70	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.66	0.66	0.66	0.65	0.65	0.65	0.65	0.64	0.64	0.64	0.63
1,700	1.04	1.00	0.95	0.91	0.88	0.84	0.81	0.79	0.78	0.77	0.76	0.76	0.75	0.75	0.75	0.74	0.74	0.73	0.73	0.73	0.72	0.72	0.72	0.71	0.71	0.71	0.70	0.70	0.70	0.69	0.69	0.69	0.69	0.68	0.68	0.68	0.67
1,800	1.20	1.14	1.09	1.04	0.99	0.95	0.92	0.88	0.85	0.83	0.82	0.81	0.80	0.79	0.79	0.79	0.78	0.78	0.77	0.77	0.77	0.76	0.76	0.76	0.75	0.75	0.75	0.74	0.74	0.74	0.73	0.73	0.73	0.72	0.72	0.72	0.71
1,900	1.37	1.30	1.23	1.18	1.12	1.08	1.03	0.99	0.95	0.92	0.90	0.88	0.87	0.86	0.85	0.84	0.83	0.83	0.82	0.81	0.81	0.81	0.80	0.80	0.79	0.79	0.79	0.78	0.78	0.78	0.77	0.77	0.77	0.76	0.76	0.76	0.75
2,000	1.56	1.47	1.39	1.33	1.26	1.21	1.16	1.11	1.06	1.02	0.98	0.96	0.94	0.92	0.90	0.89	0.88	0.88	0.87	0.86	0.86	0.85	0.84	0.84	0.84	0.83	0.83	0.82	0.82	0.82	0.81	0.81	0.81	0.80	0.80	0.80	0.79
2,100	1.77	1.67	1.57	1.49	1.41	1.35	1.29	1.23	1.18	1.13	1.09	1.05	1.01	0.98	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.89	0.88	0.88	0.87	0.87	0.87	0.86	0.86	0.85	0.85	0.85	0.84	0.84	0.84	0.83
2,200	2.01	1.88	1.77	1.67	1.58	1.51	1.43	1.37	1.31	1.25	1.20	1.15	1.11	1.07	1.03	1.01	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.92	0.92	0.91	0.91	0.90	0.90	0.89	0.89	0.89	0.88	0.88	0.88	0.87
2,300	2.26	2.13	1.99	1.87	1.77	1.68	1.59	1.51	1.44	1.38	1.32	1.27	1.22	1.17	1.13	1.10	1.07	1.04	1.02	1.01	0.99	0.98	0.97	0.97	0.96	0.96	0.95	0.95	0.94	0.94	0.94	0.93	0.93	0.92	0.92	0.92	0.91
2,400	2.48	2.38	2.24	2.10	1.97	1.86	1.76	1.67	1.59	1.52	1.45	1.39	1.34	1.28	1.23	1.18	1.15	1.12	1.09	1.07	1.05	1.03	1.02	1.01	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.97	0.97	0.96	0.96	0.96	0.95
2,500	2.68	2.61	2.50	2.36	2.20	2.07	1.95	1.85	1.76	1.67	1.59	1.53	1.46	1.40	1.34	1.29	1.24	1.19	1.16	1.13	1.11	1.09	1.07	1.06	1.05	1.04	1.04	1.03	1.03	1.02	1.02	1.01	1.01	1.00	1.00	1.00	0.99
2,600	2.87	2.78	2.70	2.59	2.46	2.30	2.16	2.04	1.93	1.84	1.75	1.67	1.59	1.52	1.46	1.40	1.34	1.29	1.24	1.20	1.17	1.15	1.13	1.11	1.10	1.09	1.08	1.07	1.07	1.06	1.06	1.05	1.05	1.04	1.04	1.03	1.03
2,700	3.07	2.97	2.88	2.78	2.67	2.54	2.40	2.25	2.13	2.02	1.92	1.82	1.74	1.65	1.58	1.51	1.45	1.39	1.34	1.30	1.25	1.21	1.18	1.16	1.15	1.14	1.13	1.11	1.11	1.10	1.10	1.09	1.09	1.08	1.08	1.07	1.07
2,800	3.29	3.18	3.08	2.98	2.88	2.77	2.64	2.49	2.34	2.21	2.10	1.98	1.89	1.79	1.71	1.64	1.57	1.51	1.45	1.39	1.34	1.30	1.26	1.23	1.20	1.18	1.17	1.16	1.15	1.14	1.14	1.13	1.13	1.12	1.12	1.11	1.11
2,900	3.52	3.39	3.28	3.17	3.08	2.99	2.88	2.76	2.59	2.43	2.29	2.16	2.05	1.95	1.86	1.77	1.70	1.62	1.56	1.50	1.44	1.39	1.35	1.32	1.28	1.25	1.22	1.20	1.19	1.18	1.18	1.17	1.17	1.16	1.16	1.15	1.15
3,000	3.76	3.62	3.49	3.37	3.27	3.17	3.08	3.00	2.85	2.67	2.50	2.35	2.22	2.11	2.01	1.91	1.83	1.75	1.68	1.61	1.55	1.49	1.45	1.41	1.37	1.34	1.31	1.28	1.26	1.24	1.23	1.22	1.21	1.21	1.20	1.19	1.19
3,100	4.03	3.86	3.72	3.59	3.47	3.36	3.26	3.15	3.04	2.90	2.74	2.56	2.41	2.29	2.17	2.07	1.97	1.88	1.80	1.73	1.66	1.60	1.55	1.51	1.47	1.43	1.39	1.36	1.33	1.31	1.29	1.28	1.26	1.25	1.24	1.24	1.23
3,200	4.32	4.13	3.96	3.81	3.68	3.56	3.44	3.32	3.20	3.08	2.95	2.80	2.62	2.48	2.34	2.23	2.12	2.02	1.94	1.86	1.78	1.72	1.67	1.62	1.57	1.53	1.49	1.45	1.41	1.38	1.35	1.33	1.32	1.30	1.29	1.28	1.27
3,300	4.63	4.41	4.22	4.05	3.90	3.77	3.63	3.50	3.37	3.25	3.12	3.00	2.85	2.69	2.53	2.40	2.28	2.18	2.08	1.99	1.91	1.84	1.78	1.73	1.68	1.63	1.59	1.55	1.50	1.46	1.42	1.39	1.37	1.35	1.33	1.32	1.31
3,400	4.97	4.72	4.50	4.31	4.14	3.98	3.85	3.71	3.57	3.43	3.30	3.17	3.04	2.90	2.74	2.59	2.46	2.34	2.23	2.13	2.04	1.97	1.91	1.85	1.80	1.75	1.70	1.65	1.60	1.56	1.51	1.47	1.43	1.40	1.38	1.36	1.35
3,500	5.35	5.05	4.80	4.58	4.38	4.21	4.06	3.92	3.80	3.65	3.51	3.36	3.22	3.09	2.95	2.80	2.65	2.51	2.39	2.28	2.19	2.12	2.05	1.98	1.92	1.87	1.81	1.76	1.71	1.66	1.61	1.57	1.52	1.48	1.45	1.41	1.39
3,600	5.77	5.42	5.12	4.87	4.64	4.45	4.28	4.13	3.99	3.87	3.74	3.58	3.43	3.28	3.14	2.99	2.85	2.70	2.56	2.44	2.35	2.27	2.19	2.12	2.05	1.99	1.93	1.87	1.81	1.76	1.71	1.66	1.62	1.57	1.53	1.50	1.46
3,700	6.24	5.83	5.47	5.17	4.92	4.70	4.52	4.35	4.20	4.06	3.94	3.82	3.67	3.51	3.35	3.19	3.04	2.89	2.75	2.62	2.52	2.43	2.34	2.27	2.19	2.12	2.06	1.99	1.93	1.87	1.82	1.77	1.72	1.67	1.63	1.58	1.55
3,800	6.77	6.25	5.84	5.50	5.21	4.97	4.76	4.58	4.41	4.26	4.13	4.00	3.89	3.77	3.60	3.42	3.25	3.10	2.94	2.81	2.70	2.60	2.51	2.42	2.34	2.26	2.19	2.12	2.05	1.99	1.93	1.87	1.82	1.77	1.72	1.68	1.64
3,900	7.35	6.72	6.24	5.85	5.53	5.25	5.02	4.81	4.63	4.47	4.32	4.19	4.06	3.95	3.85	3.70	3.51	3.33	3.16	3.02	2.90	2.79	2.68	2.58	2.50	2.41	2.33	2.25	2.18	2.11	2.05	1.99	1.93	1.88	1.82	1.78	1.73
4,000	7.99	7.25	6.68	6.23	5.86	5.55	5.29	5.06	4.86	4.68	4.52	4.37	4.24	4.12	4.01	3.91	3.81	3.62	3.41	3.25	3.11	2.98	2.87	2.76	2.66	2.57	2.48	2.40	2.32	2.24	2.17	2.11	2.05	1.99	1.93	1.88	1.83
4,100	8.75	7.83	7.16	6.64	6.22	5.87	5.58	5.32	5.10	4.90	4.73	4.57	4.43	4.30	4.18	4.06	3.96	3.86	3.71	3.51	3.34	3.19	3.06	2.95	2.84	2.74	2.64	2.55	2.46	2.38	2.31	2.23	2.17	2.10	2.04	1.99	1.93
4,200	9.63	8.50	7.69	7.09	6.61	6.21	5.88	5.60	5.35	5.13	4.94	4.77	4.62	4.48	4.35	4.23	4.12	4.02	3.91	3.80	3.60	3.43	3.28	3.15	3.02	2.91	2.81	2.71	2.61	2.53	2.44	2.37	2.30	2.23	2.16	2.10	2.04
4,300	10.71	9.27	8.29	7.58	7.03	6.58	6.20	5.89	5.62	5.38	5.17	4.98	4.81	4.66	4.53	4.40	4.28	4.19	4.08	3.97	3.85	3.69	3.52	3.36	3.22	3.10	2.98	2.88	2.78	2.68	2.59	2.51	2.43	2.35	2.28	2.22	2.16
4,400	36.00	10.17	8.97	8.12	7.48	6.97	6.55	6.20	5.90	5.63	5.40	5.20	5.02	4.85	4.70	4.57	4.46	4.36	4.26	4.16	4.04	3.92	3.77	3.59	3.44	3.30	3.17	3.06	2.95	2.84	2.75	2.66	2.57	2.49	2.41	2.34	2.28
4,500	36.00	11.25	9.75	8.73	7.97	7.39	6.92	6.52	6.19	5.90	5.65	5.43	5.23	5.05	4.89	4.75	4.64	4.54	4.44	4.35	4.24	4.13	3.99	3.84	3.67	3.52	3.38	3.25	3.13	3.02	2.91	2.81	2.72	2.63	2.55	2.47	2.40
4,600	36.00	36.00	10.66	9.42	8.53	7.85	7.31	6.87	6.50	6.18	5.91	5.67	5.45	5.26	5.08	4.94	4.82	4.72	4.62	4.52	4.43	4.33	4.22	4.08	3.92	3.75	3.59	3.45	3.32	3.20	3.08	2.98	2.88	2.78	2.69	2.61	2.53
4,700	36.00	36.00	11.76	10.21	9.14	8.35	7.74	7.25	6.83	6.48	6.18	5.91	5.68	5.47	5.28	5.14	5.01	4.90	4.79	4.69	4.59	4.50	4.41	4.31	4.19	4.00	3.83	3.67	3.53	3.39	3.27	3.15	3.04	2.94	2.84	2.75	2.67
4,800	36.00	36.00	36.00	11.13	9.84	8.91	8.21	7.65	7.19	6.80	6.46	6.17	5.92	5.69	5.50	5.35	5.22	5.09	4.97	4.86	4.76	4.66	4.57	4.48	4.40	4.26	4.08	3.90	3.75	3.60	3.46	3.33	3.21	3.10	3.00	2.90	2.81
4,900	36.00	36.00	36.00	12.22	10.63	9.54	8.72	8.08	7.56	7.13	6.76	6.45	6.17	5.92	5.73	5.57	5.43	5.29	5.17	5.05	4.94	4.83	4.73	4.64	4.55	4.46	4.33	4.16	3.98	3.82	3.67	3.53	3.40	3.28	3.16	3.06	2.97
5,000	36.00	36.00	36.00	36.00	11.56	10.24	9.28	8.55	7.96	7.48	7.08	6.73	6.43	6.17	5.98	5.80	5.65	5.50	5.37	5.24	5.12	5.01	4.90	4.80	4.71	4.63	4.53	4.41	4.23	4.05	3.88	3.73	3.59	3.46	3.34	3.23	3.13
5,200	36.00	36.00	36.00	36.00	36.00	11.96	10.61	9.63	8.87	8.27	7.77	7.35	7.00	6.73	6.51	6.30	6.11	5.94	5.79	5.64	5.50	5.38	5.26	5.14	5.04	4.95	4.86	4.78	4.69	4.57	4.37	4.18	4.02	3.86	3.72	3.59	3.48
5,400	36.00	36.00	36.00	36.00	36.00	36.00	12.34	10.96	9.96	9.19	8.56	8.05	7.65	7.37	7.10	6.85	6.63	6.43	6.24	6.07	5.92	5.77	5.63	5.51	5.40	5.30	5.20	5.10	5.01	4.92	4.83	4.71	4.51	4.32	4.15	4.00	3.86
5,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	12.70	11.30	10.28	9.49	8.87	8.44	8.06	7.74	7.46	7.20	6.96	6.74	6.54	6.36	6.19	6.04	5.89	5.78	5.67	5.56	5.45	5.35	5.25	5.15	5.06	4.96	4.84	4.64	4.45	4.29
5,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	13.03	11.62	10.59	9.91	9.35	8.88	8.48	8.13	7.81	7.54	7.29	7.06	6.84	6.65	6.47	6.32	6.19	6.06	5.94	5.83	5.71	5.59	5.48	5.38	5.28	5.18	5.09	4.97	4.75
6,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	13.35	12.09	11.17	10.43	9.83	9.32	8.89	8.51	8.18	7.88	7.61	7.37	7.15	6.94	6.77	6.63	6.49	6.36	6.22	6.08	5.96	5.83	5.72	5.60	5.50	5.40	5.30	5.21
6,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	14.06	12.73	11.74	10.95	10.30	9.76	9.30	8.90	8.54	8.23	7.94	7.69	7.45	7.27	7.11	6.95	6.80	6.64	6.49	6.34	6.20	6.07	5.95	5.82	5.71	5.60	5.49
6,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	13.36	12.29	11.45	10.77	10.19	9.70	9.27	8.90	8.57	8.27	8.01	7.81	7.62	7.45	7.28	7.09	6.91	6.75	6.59	6.44	6.29	6.15	6.02	5.89	5.77
6,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	13.98	12.84	11.95	11.23	10.62	10.10	9.65	9.26	8.91	8.63	8.41	8.19	7.99	7.78	7.56	7.36	7.18	6.98	6.80	6.64	6.48	6.34	6.21	6.07
6,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	14.57	13.38	12.43	11.68	11.05	10.49	10.02	9.60	9.31	9.05	8.82	8.59	8.32	8.05	7.82	7.60	7.39	7.19	7.01	6.85	6.70	6.55	6.40
7,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	15.13	13.92	12.92	12.12	11.46	10.89	10.40	10.07	9.78	9.50	9.24	8.90	8.58	8.31	8.06	7.83	7.61	7.42	7.24	7.07	6.91	6.74
7,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	15.67	14.43	13.40	12.55	11.87	11.33	10.93	10.57	10.26	9.92	9.52	9.16	8.84	8.57	8.31	8.07	7.86	7.66	7.47	7.28	7.10
7,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	14.93	13.87	12.98	12.39	11.92	11.47	11.08	10.66	10.21	9.80	9.43	9.12	8.83	8.57	8.33	8.10	7.89	7.68	7.47
7,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	15.43	14.36	13.66	13.04	12.50	12.05	11.47	10.96	10.49	10.08	9.72	9.39	9.10	8.83	8.58	8.34	8.10	7.87
7,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	16.07	15.18	14.41	13.75	13.12	12.41	11.81	11.27	10.80	10.38	10.01	9.68	9.37	9.09	8.81	8.54	8.29
8,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	16.09	15.23	14.36	13.48	12.76	12.14	11.59	11.11	10.69	10.31	9.96	9.64	9.31	9.00	8.72
8,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	16.94	15.87	14.74	13.84	13.11	12.46	11.91	11.43	10.99	10.59	10.22	9.85	9.50	9.19
8,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	16.24	15.13	14.22	13.44	12.81	12.26	11.76	11.30	10.85	10.42	10.03	9.69
8,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	16.59	15.52	14.59	13.80	13.14	12.56	11.98	11.45	10.95	10.52	10.14
8,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	16.74	15.81	14.82	14.05	13.38	12.71	12.10	11.54	11.06	10.63
9,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	17.02	16.03	15.16	14.33	13.53	12.81	12.19	11.65	11.18
9,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	17.58	16.53	15.48	14.50	13.66	12.94	12.32	11.79
9,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	18.22	16.80	15.60	14.62	13.77	13.07	12.48
9,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	18.46	16.95	15.73	14.73	13.92	13.23
9,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	18.24	16.81	15.62	14.70	13.94
10,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	18.11	16.73	15.68	14.82
10,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	18.08	16.84	15.84
10,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	19.81	18.26	17.01
10,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	19.59	18.12
10,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	19.22
11,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	20.37
11,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
11,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
11,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
11,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
12,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
13,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
14,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
15,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
16,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
17,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
18,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
19,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
20,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
21,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
22,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
23,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
24,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
25,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
26,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
27,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
28,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
29,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
30,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00

Table 5 Wild Rice River Control Structure (WRRCS) Gate Opening (ft) - Part C

Flow through WRRCS (cfs)	Staging Area Elevation at Wild Rice River, $Z_{STAGING-AREA-WRR}$ (ft)																																			
	915.2	915.4	915.6	915.8	916.0	916.2	916.4	916.6	916.8	917.0	917.2	917.4	917.6	917.8	918.0	918.2	918.4	918.6	918.8	919.0	919.2	919.4	919.6	919.8	920.0	920.2	920.4	920.6	920.8	921.0	921.2	921.4	921.6	921.8	922.0	922.2	922.4
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
700	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24
800	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
900	0.36	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.31
1,000	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
1,100	0.43	0.43	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.38
1,200	0.47	0.47	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.45	0.45	0.44	0.44	0.44	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.42
1,300	0.51	0.51	0.51	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.48	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.46	0.45	0.45	0.45	0.45
1,400	0.55	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.51	0.51	0.51	0.51	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.48
1,500	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.57	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.56	0.55	0.55	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52
1,600	0.63	0.63	0.63	0.62	0.62	0.62	0.62	0.61	0.61	0.61	0.61	0.60	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.57	0.57	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.56	0.56	0.55
1,700	0.67	0.67	0.67	0.66	0.66	0.66	0.66	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.64	0.63	0.63	0.63	0.63	0.62	0.62	0.62	0.62	0.61	0.61	0.61	0.61	0.61	0.60	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59
1,800	0.71	0.71	0.70	0.70	0.70	0.70	0.69	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.67	0.66	0.66	0.66	0.66	0.65	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.64	0.63	0.63	0.63	0.63	0.62	0.62
1,900	0.75	0.75	0.74	0.74	0.74	0.73	0.73	0.73	0.73	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.70	0.70	0.70	0.70	0.69	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.67	0.66	0.66	0.66	0.66
2,000	0.79	0.79	0.78	0.78	0.78	0.77	0.77	0.77	0.76	0.76	0.76	0.76	0.75	0.75	0.75	0.74	0.74	0.74	0.74	0.73	0.73	0.73	0.73	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.70	0.70	0.70	0.70	0.69	0.69
2,100	0.83	0.83	0.82	0.82	0.82	0.81	0.81	0.81	0.80	0.80	0.80	0.79	0.79	0.79	0.78	0.78	0.78	0.78	0.77	0.77	0.77	0.76	0.76	0.76	0.76	0.75	0.75	0.75	0.75	0.74	0.74	0.74	0.74	0.73	0.73	0.73	0.73
2,200	0.87	0.86	0.86	0.86	0.85	0.85	0.85	0.84	0.84	0.84	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.81	0.81	0.81	0.80	0.80	0.80	0.80	0.79	0.79	0.79	0.78	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.76	0.76
2,300	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86	0.86	0.85	0.85	0.85	0.84	0.84	0.84	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.80	0.80	0.80	0.80
2,400	0.95	0.94	0.94	0.94	0.93	0.93	0.92	0.92	0.92	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.83	0.83
2,500	0.99	0.98	0.98	0.97	0.97	0.97	0.96	0.96	0.96	0.95	0.95	0.94	0.94	0.94	0.93	0.93	0.93	0.92	0.92	0.92	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.87	0.87	0.87	0.87
2,600	1.03	1.02	1.02	1.01	1.01	1.01	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.97	0.97	0.97	0.96	0.96	0.96	0.95	0.95	0.95	0.94	0.94	0.94	0.93	0.93	0.93	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.90	0.90
2,700	1.07	1.06	1.06	1.05	1.05	1.04	1.04	1.04	1.03	1.03	1.02	1.02	1.02	1.01	1.01	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.98	0.97	0.97	0.97	0.96	0.96	0.96	0.95	0.95	0.95	0.94	0.94	0.94	0.93
2,800	1.11	1.10	1.10	1.09	1.09	1.08	1.08	1.07	1.07	1.07	1.06	1.06	1.05	1.05	1.05	1.04	1.04	1.03	1.03	1.03	1.02	1.02	1.02	1.01	1.01	1.01	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.98	0.97	0.97
2,900	1.14	1.14	1.14	1.13	1.13	1.12	1.12	1.11	1.11	1.10	1.10	1.10	1.09	1.09	1.08	1.08	1.08	1.07	1.07	1.06	1.06	1.06	1.05	1.05	1.04	1.04	1.04	1.03	1.03	1.03	1.02	1.02	1.02	1.01	1.01	1.01	1.00
3,000	1.18	1.18	1.17	1.17	1.16	1.16	1.16	1.15	1.15	1.14	1.14	1.13	1.13	1.12	1.12	1.12	1.11	1.11	1.10	1.10	1.10	1.09	1.09	1.08	1.08	1.08	1.07	1.07	1.07	1.06	1.06	1.06	1.05	1.05	1.04	1.04	1.04
3,100	1.22	1.22	1.21	1.21	1.20	1.20	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.16	1.16	1.15	1.15	1.15	1.14	1.14	1.13	1.13	1.12	1.12	1.12	1.11	1.11	1.11	1.10	1.10	1.09	1.09	1.09	1.08	1.08	1.08	1.07
3,200	1.26	1.26	1.25	1.25	1.24	1.24	1.23	1.23	1.22	1.22	1.21	1.21	1.20	1.20	1.20	1.19	1.19	1.18	1.18	1.17	1.17	1.17	1.16	1.16	1.15	1.15	1.14	1.14	1.14	1.13	1.13	1.13	1.12	1.12	1.11	1.11	1.11
3,300	1.30	1.30	1.29	1.29	1.28	1.28	1.27	1.27	1.26	1.26	1.25	1.25	1.24	1.24	1.23	1.23	1.22	1.22	1.21	1.21	1.21	1.20	1.20	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.16	1.16	1.16	1.15	1.15	1.15	1.14
3,400	1.34	1.34	1.33	1.33	1.32	1.31	1.31	1.30	1.30	1.29	1.29	1.28	1.28	1.27	1.27	1.27	1.26	1.26	1.25	1.25	1.24	1.24	1.23	1.23	1.22	1.22	1.22	1.21	1.21	1.20	1.20	1.20	1.19	1.19	1.18	1.18	1.18
3,500	1.38	1.38	1.37	1.36	1.36	1.35	1.35	1.34	1.34	1.33	1.33	1.32	1.32	1.31	1.31	1.30	1.30	1.29	1.29	1.28	1.28	1.27	1.27	1.27	1.26	1.26	1.25	1.25	1.24	1.24	1.24	1.23	1.23	1.22	1.22	1.22	1.21
3,600	1.44	1.43	1.41	1.40	1.40	1.39	1.39	1.38	1.38	1.37	1.37	1.36	1.35	1.35	1.34	1.34	1.33	1.33	1.33	1.32	1.32	1.31	1.31	1.30	1.30	1.29	1.29	1.28	1.28	1.27	1.27	1.27	1.26	1.26	1.25	1.25	1.25
3,700	1.52	1.50	1.48	1.46	1.45	1.44	1.43	1.42	1.41	1.41	1.40	1.40	1.39	1.39	1.38	1.38	1.37	1.37	1.36	1.36	1.35	1.35	1.34	1.34	1.33	1.33	1.32	1.32	1.31	1.31	1.31	1.30	1.30	1.29	1.29	1.28	1.28
3,800	1.60	1.57	1.54	1.52	1.50	1.48	1.47	1.46	1.45	1.45	1.44	1.44	1.43	1.42	1.42	1.41	1.41	1.40	1.40	1.39	1.39	1.38	1.38	1.37	1.37	1.36	1.36	1.35	1.35	1.35	1.34	1.34	1.33	1.33	1.32	1.32	1.31
3,900	1.69	1.65	1.60	1.57	1.55	1.53	1.51	1.50	1.49	1.48	1.48	1.47	1.47	1.46	1.46	1.45	1.45	1.44	1.44	1.43	1.43	1.42	1.41	1.41	1.41	1.40	1.40	1.39	1.39	1.38	1.38	1.37	1.37	1.36	1.36	1.35	1.35
4,000	1.79	1.74	1.69	1.64	1.60	1.57	1.55	1.54	1.53	1.52	1.52	1.51	1.51	1.50	1.49	1.49	1.48	1.48	1.47	1.47	1.46	1.46	1.45	1.45	1.44	1.44	1.43	1.43	1.42	1.42	1.41	1.41	1.40	1.40	1.39	1.39	1.38
4,100	1.89	1.83	1.78	1.73	1.68	1.64	1.60	1.58	1.57	1.56	1.55	1.55	1.54	1.54	1.53	1.53	1.52	1.51	1.51	1.50	1.50	1.49	1.49	1.48	1.48	1.47	1.47	1.46	1.46	1.45	1.45	1.44	1.44	1.43	1.43	1.42	1.42
4,200	1.99	1.94	1.88	1.82	1.77	1.72	1.67	1.63	1.61	1.60	1.59	1.59	1.58	1.57	1.57	1.56	1.56	1.55	1.55	1.54	1.53	1.53	1.52	1.52	1.51	1.51	1.50	1.50	1.49	1.49	1.48	1.48	1.47	1.47	1.46	1.46	1.45
4,300	2.10	2.04	1.98	1.92	1.86	1.81	1.76	1.71	1.68	1.66	1.65	1.63	1.62	1.61	1.61	1.60	1.59	1.59	1.58	1.58	1.57	1.57	1.56	1.55	1.55	1.54	1.54	1.53	1.53	1.52	1.52	1.51	1.51	1.50	1.50	1.49	1.49
4,400	2.21	2.15	2.08	2.02	1.96	1.90	1.85	1.80	1.75	1.72	1.70	1.68	1.67	1.65	1.64	1.64	1.63	1.63	1.62	1.61	1.61	1.60	1.60	1.59	1.59	1.58	1.57	1.57	1.56	1.56	1.55	1.55	1.54	1.54	1.53	1.53	1.52
4,500	2.33	2.26	2.19	2.12	2.06	1.99	1.94	1.89	1.83	1.79	1.76	1.73	1.71	1.70	1.68	1.67	1.67	1.66	1.66	1.65	1.64	1.64	1.63	1.63	1.62	1.62	1.61	1.60	1.60	1.59	1.59	1.58	1.58	1.57	1.57	1.56	1.56
4,600	2.46	2.38	2.30	2.23	2.16	2.10	2.03	1.98	1.92	1.87	1.82	1.78	1.76	1.74	1.72	1.71	1.71	1.70	1.69	1.69	1.68	1.67	1.67	1.66	1.66	1.65	1.65	1.64	1.63	1.63	1.62	1.62	1.61	1.61	1.60	1.60	1.59
4,700	2.59	2.51	2.42	2.34	2.27	2.20	2.13	2.07	2.01	1.96	1.91	1.86	1.81	1.78	1.76	1.75	1.74	1.74	1.73	1.72	1.72	1.71	1.70	1.70	1.69	1.69	1.68	1.68	1.67	1.66	1.66	1.65	1.65	1.64	1.64	1.63	1.63
4,800	2.73	2.64	2.55	2.46	2.38	2.31	2.24	2.17	2.11	2.05	1.99	1.94	1.89	1.84	1.80	1.79	1.78	1.77	1.77	1.76	1.75	1.75	1.74	1.74	1.73	1.72	1.72	1.71	1.71	1.70	1.69	1.69	1.68	1.68	1.67	1.67	1.66
4,900	2.88	2.77	2.68	2.58	2.50	2.42	2.35	2.28	2.21	2.15	2.09	2.03	1.97	1.92	1.87	1.84	1.83	1.81	1.80	1.80	1.79	1.78	1.78	1.77	1.76	1.76	1.75	1.75	1.74	1.73	1.73	1.72	1.72	1.71	1.71	1.70	1.70
5,000	3.03	2.92	2.81	2.71	2.62	2.54	2.46	2.38	2.31	2.25	2.18	2.12	2.06	2.01	1.95	1.92	1.89	1.87	1.85	1.84	1.83	1.82	1.81	1.81	1.80	1.79	1.79	1.78	1.78	1.77	1.76	1.76	1.75	1.75	1.74	1.74	1.73
5,200	3.36	3.22	3.10	2.99	2.89	2.79	2.70	2.61	2.53	2.46	2.38	2.32	2.25	2.19	2.13	2.07	2.02	1.98	1.95	1.93	1.91	1.89	1.89	1.88	1.87	1.87	1.86	1.85	1.85	1.84	1.83	1.83	1.82	1.82	1.81	1.80	1.80
5,400	3.72	3.57	3.42	3.29	3.18	3.07	2.96	2.86	2.77	2.69	2.60	2.52	2.45	2.38	2.31	2.25	2.19	2.13	2.08	2.02	1.98	1.97	1.96	1.95	1.94	1.94	1.93	1.92	1.92	1.91	1.91	1.90	1.89	1.89	1.88	1.87	1.87
5,600	4.11	3.93	3.77	3.62	3.49	3.36	3.24	3.13	3.03	2.93	2.83	2.75	2.66	2.58	2.51	2.44	2.37	2.30	2.24	2.18	2.13	2.08	2.05	2.04	2.02	2.01	2.00	2.00	1.99	1.98	1.98	1.97	1.96	1.96	1.95	1.94	1.94
5,800	4.54	4.33	4.15	3.98	3.82	3.68	3.55	3.42	3.30	3.19	3.08	2.98	2.89	2.80	2.71	2.63	2.56	2.49	2.42	2.35	2.29	2.23	2.18	2.14	2.11	2.09	2.07	2.07	2.06	2.05	2.05	2.04	2.03	2.03	2.02	2.01	2.01
6,000	5.01	4.77	4.56	4.36	4.18	4.02	3.86	3.72	3.58	3.45	3.33	3.22	3.11	3.01	2.92	2.83	2.74	2.66	2.59	2.52	2.45	2.38	2.32	2.26	2.21	2.17	2.15	2.14	2.13	2.12	2.12	2.11	2.10	2.10	2.09	2.08	2.08
6,200	5.38	5.21	4.97	4.74	4.54	4.35	4.17	4.01	3.86	3.71	3.58	3.45	3.34	3.23	3.12	3.03	2.93	2.85	2.76	2.69	2.61	2.54	2.48	2.41	2.35	2.29	2.24	2.22	2.20	2.19	2.19	2.18	2.17	2.17	2.16	2.15	2.14
6,400	5.65	5.54	5.39	5.14	4.91	4.70	4.50	4.32	4.16	4.00	3.86	3.72	3.59	3.47	3.36	3.25	3.15	3.05	2.96	2.87	2.79	2.72	2.64	2.57	2.51	2.44	2.38	2.34	2.31	2.28	2.27	2.25	2.24	2.24	2.23	2.22	2.21
6,600	5.95	5.83	5.71	5.61	5.34	5.11	4.89	4.69	4.51	4.33	4.17	4.02	3.87	3.74	3.61	3.49	3.38	3.27	3.17	3.08	2.99	2.90	2.82	2.75	2.67	2.60	2.54	2.48	2.42	2.37	2.35	2.32	2.31	2.30	2.30	2.29	2.28
6,800	6.26	6.13	6.01	5.89	5.78	5.57	5.32	5.09	4.88	4.69	4.50	4.33	4.17	4.03	3.89	3.75	3.63	3.51	3.40	3.30	3.20	3.10	3.01	2.93	2.85	2.77	2.70	2.63	2.57	2.51	2.45	2.39	2.38	2.37	2.37	2.36	2.35
7,000	6.59	6.44	6.31	6.19	6.07	5.96	5.79	5.53	5.29	5.07	4.86	4.67	4.50	4.33	4.18	4.03	3.89	3.76	3.64	3.52	3.41	3.31	3.21	3.12	3.04	2.95	2.88	2.80	2.73	2.66	2.60	2.53	2.49	2.47	2.45	2.43	2.42
7,200	6.93	6.77	6.63	6.49	6.36	6.24	6.13	6.01	5.73	5.48	5.25	5.04	4.85	4.66	4.49	4.32	4.17	4.03	3.89	3.77	3.65	3.53	3.43	3.33	3.23	3.14	3.06	2.97	2.90	2.82	2.75	2.69	2.62	2.57	2.54	2.51	2.49
7,400	7.29	7.11	6.96	6.81	6.67	6.54	6.42	6.30	6.18	5.93	5.67	5.44	5.22	5.01	4.82	4.64	4.47	4.31	4.16	4.02	3.89	3.77	3.65	3.54	3.44	3.34	3.24	3.16	3.07	2.99	2.92	2.84	2.77	2.71	2.65	2.59	2.56
7,600	7.66	7.48	7.31	7.14	7.00	6.85	6.72	6.59	6.47	6.35	6.13	5.87	5.62	5.39	5.17	4.97	4.78	4.61	4.44	4.29	4.15	4.01	3.88	3.76	3.65	3.54	3.44	3.35	3.26	3.17	3.09	3.01	2.93	2.86	2.79	2.73	2.66
7,800	8.06	7.86	7.67	7.49	7.33	7.17	7.03	6.89	6.75	6.63	6.51	6.32	6.04	5.78	5.54	5.32	5.12	4.92	4.74	4.57	4.42	4.27	4.13	4.00	3.88	3.76	3.65	3.55	3.45	3.35	3.26	3.18	3.10	3.02	2.95	2.88	2.81
8,000	8.47	8.25	8.04	7.85	7.67	7.50	7.34	7.19	7.05	6.92	6.79	6.67	6.50	6.21	5.94	5.70	5.47	5.26	5.06	4.88	4.70	4.54	4.39	4.25	4.11	3.99	3.87	3.75	3.65	3.54	3.45	3.36	3.27	3.19	3.11	3.03	2.96
8,200	8.91	8.67	8.44	8.23	8.03	7.85	7.68	7.52	7.36	7.22	7.08	6.95	6.82	6.65	6.37	6.09	5.84	5.61	5.39	5.19	5.00	4.82	4.66	4.50	4.36	4.22	4.09	3.97	3.85	3.74	3.64	3.54	3.44	3.36	3.27	3.19	3.11
8,400	9.38	9.09	8.85	8.62	8.39	8.19	8.00	7.82	7.66	7.50	7.35	7.21	7.08	6.95	6.76	6.46	6.18	5.93	5.70	5.48	5.28	5.09	4.91	4.74	4.58	4.44	4.30	4.17	4.04	3.93	3.81	3.71	3.61	3.52	3.42	3.34	3.26
8,600	9.80	9.50	9.23	8.97	8.74	8.53	8.33	8.14	7.96	7.79	7.63	7.48	7.34	7.20	7.07	6.85	6.55	6.28	6.02	5.79	5.57	5.36	5.17	4.99	4.82	4.67	4.52	4.38	4.24	4.12	4.00	3.89	3.78	3.68	3.58	3.49	3.40
8,800	10.27	9.94	9.65	9.37	9.12	8.89	8.67	8.47	8.28	8.10	7.93	7.77	7.61	7.47	7.33	7.20	6.95	6.65	6.38	6.12	5.88	5.66	5.45	5.26	5.08	4.91	4.75	4.60	4.46	4.32	4.20	4.08	3.96	3.86	3.75	3.66	3.56
9,000	10.78	10.42	10.10	9.80	9.53	9.28	9.04	8.82	8.61	8.42	8.24	8.06	7.90	7.74	7.60	7.46	7.33	7.06	6.76	6.48	6.22	5.98	5.76	5.55	5.35	5.17	5.00	4.84	4.69	4.54	4.41	4.28	4.16	4.04	3.93	3.83	3.73
9,200	11.35	10.95	10.60	10.28	9.97	9.70	9.44	9.20	8.99	8.78	8.58	8.39	8.21	8.05	7.89	7.74	7.60	7.47	7.20	6.89	6.61	6.35	6.11	5.88	5.67	5.47	5.28	5.11	4.94	4.79	4.64	4.50	4.37	4.25	4.13	4.02	3.91
9,400	11.98	11.54	11.15	10.79	10.46	10.16	9.88	9.62	9.38	9.15	8.93	8.73	8.53	8.36	8.19	8.03	7.88	7.74	7.61	7.34	7.02	6.74	6.48	6.23	6.00	5.78	5.58	5.39	5.21	5.05	4.89	4.74	4.60	4.47	4.34	4.22	4.11
9,600	12.66	12.16	11.72	11.31	10.94	10.63	10.31	10.02	9.76	9.51	9.27	9.06	8.85	8.66	8.48	8.32	8.16	8.00	7.86	7.72	7.42	7.11	6.82	6.56	6.32	6.09	5.87	5.67	5.48	5.30	5.13	4.97	4.82	4.68	4.54	4.42	4.30
9,800	13.33	12.78	12.30	11.86	11.47	11.11	10.78	10.46	10.17	9.90	9.64	9.41	9.19	8.98	8.79	8.61	8.44	8.28	8.13	7.99	7.85	7.52	7.21	6.92	6.65	6.40	6.17	5.96	5.75	5.56	5.38	5.21	5.05	4.90	4.76	4.62	4.49
10,000	14.13	13.51	12.97	12.48	12.05	11.64	11.26	10.91	10.59	10.30	10.03	9.77	9.53	9.31	9.11	8.92	8.74	8.57	8.41	8.25	8.11	7.96	7.62	7.31	7.02	6.75	6.50	6.27	6.05	5.84	5.65	5.47	5.30	5.14	4.98	4.84	4.70
10,200	15.04	14.33	13.70	13.13	12.64	12.18	11.75	11.37	11.02	10.69	10.40	10.13	9.88	9.65	9.43	9.22	9.03	8.85	8.68	8.52	8.37	8.22	8.05	7.70	7.40	7.10	6.83	6.58	6.35	6.13	5.92	5.73	5.54	5.37	5.21	5.05	4.91
10,400	16.01	15.16	14.43	13.78	13.22	12.70	12.23	11.82	11.44	11.10	10.78	10.49	10.23	9.97	9.74	9.52	9.32	9.13	8.95	8.78	8.62	8.47	8.32	8.10	7.75	7.44	7.16	6.89	6.64	6.40	6.19	5.98	5.78	5.60	5.43	5.27	5.11
10,600	16.95	15.97	15.13	14.40	13.81	13.25	12.74	12.29	11.89	11.52	11.17	10.86	10.57	10.31	10.06	9.83	9.62	9.42	9.23	9.05	8.88	8.72	8.57	8.43	8.12	7.78	7.47	7.19	6.92	6.67	6.44	6.22	6.02	5.83	5.65	5.47	5.31
10,800	17.87	16.79	15.92	15.15	14.44	13.81	13.25	12.76	12.32	11.92	11.56	11.23	10.92	10.64	10.38	10.14	9.91	9.70	9.50	9.31	9.14	8.97	8.81	8.66	8.50	8.14	7.80	7.49	7.22	6.96	6.71	6.48	6.26	6.06	5.87	5.69	5.52
11,000	19.03	17.78	16.75	15.82	15.03	14.34	13.74	13.21	12.74	12.31	11.93	11.58	11.25	10.96	10.68	10.43	10.19	9.97	9.76	9.57	9.38	9.21	9.04	8.89	8.74	8.50	8.14	7.81	7.52	7.24	6.98	6.74	6.51	6.30	6.09	5.90	5.72
11,200	20.16	18.68	17.46	16.43	15.57	14.84	14.20	13.63	13.14	12.69	12.28	11.91	11.57	11.26	10.98	10.71	10.46	10.23	10.01	9.81	9.62	9.44	9.27	9.11	8.95	8.81	8.45	8.10	7.79	7.50	7.23	6.97	6.73	6.51	6.30	6.10	5.91
11,400	36.00	19.48	18.13	17.03	16.10	15.32	14.64	14.05	13.52	13.05	12.62	12.24	11.89	11.56	11.26	10.98	10.72	10.49	10.26	10.05	9.85	9.66	9.49	9.32	9.16	9.01	8.74	8.37	8.05	7.74	7.46	7.19	6.95	6.71	6.49	6.29	6.09
11,600	36.00	20.24	18.78	17.60	16.62	15.80	15.08	14.45	13.90	13.41	12.96	12.56	12.19	11.85	11.54	11.25	10.98	10.73	10.50	10.28	10.08	9.89	9.70	9.53	9.37	9.21	9.03	8.64	8.30	7.98	7.69	7.41	7.15	6.91	6.68	6.47	6.26
11,800	36.00	21.06	19.41	18.15	17.12	16.25	15.50	14.84	14.26	13.75	13.28	12.86	12.48	12.13	11.81	11.51	11.23	10.98	10.73	10.51	10.30	10.10	9.91	9.73	9.57	9.41	9.25	8.90	8.54	8.21	7.91	7.62	7.35	7.10	6.87	6.64	6.43
12,000	36.00	36.00	20.01	18.69	17.60	16.68	15.90	15.21	14.61	14.08	13.60	13.16	12.76	12.40	12.07	11.76	11.48	11.21	10.96	10.73	10.52	10.31	10.12	9.93	9.76	9.60	9.44	9.14	8.77	8.43	8.12	7.82	7.55	7.29	7.04	6.81	6.60
12,200	36.00	36.00	20.59	19.20	18.07	17.11	16.29	15.58	14.96	14.40	13.90	13.45	13.04	12.67	12.33	12.01	11.72	11.44	11.19	10.95	10.73	10.52	10.32	10.13	9.95	9.78	9.62	9.38	9.00	8.65	8.32	8.02	7.73	7.46	7.21	6.98	6.75
12,400	36.00	36.00	21.20	19.71	18.52	17.52	16.67	15.94	15.29	14.72	14.20	13.74	13.32	12.93	12.58	12.25	11.95	11.67	11.41	11.17	10.94	10.72	10.52	10.32	10.14	9.97	9.81	9.62	9.22	8.85	8.52	8.21	7.91	7.64	7.38	7.14	6.91
12,600	36.00	36.00	36.00	20.20	18.97	17.93	17.05	16.29	15.62	15.03	14.50	14.02	13.59	13.19	12.83	12.50	12.18	11.90	11.63	11.38	11.14	10.92	10.71	10.52	10.33	10.15	9.99	9.81	9.43	9.06	8.71	8.39	8.09	7.81	7.54	7.29	7.06
12,800	36.00	36.00	36.00	20.69	19.40	18.33	17.42	16.63	15.94	15.33	14.79	14.30	13.85	13.45	13.08	12.73	12.41	12.12	11.85	11.59	11.35	11.12	10.91	10.71	10.52	10.34	10.16	10.00	9.64	9.26	8.90	8.57	8.26	7.98	7.70	7.45	7.21
13,000	36.00	36.00	36.00	21.15	19.83	18.72	17.78	16.97	16.26	15.64	15.08	14.57	14.12	13.70	13.32	12.97	12.64	12.34	12.06	11.80	11.55	11.32	11.10	10.90	10.70	10.52	10.34	10.18	9.85	9.46	9.09	8.75	8.44	8.14	7.86	7.60	7.36
13,200	36.00	36.00	36.00	21.62	20.26	19.12	18.15	17.31	16.58	15.94	15.36	14.85	14.38	13.95	13.56	13.20	12.87	12.56	12.27	12.01	11.75	11.52	11.30	11.09	10.89	10.70	10.52	10.35	10.05	9.65	9.28	8.93	8.61	8.31	8.02	7.75	7.50
13,400	36.00	36.00	36.00	22.36	20.68	19.50	18.51	17.65	16.90	16.24	15.65	15.12	14.64	14.20	13.80	13.44	13.10	12.78	12.49	12.21	11.96	11.72	11.49	11.27	11.07	10.88	10.70	10.52	10.26	9.85	9.46	9.11	8.78	8.47	8.18	7.90	7.65
13,600	36.00	36.00	36.00	36.00	21.09	19.89	18.86	17.98	17.21	16.53	15.93	15.39	14.90	14.45	14.04	13.67	13.32	13.00	12.70	12.42	12.16	11.91	11.68	11.46	11.25	11.06	10.87	10.69	10.46	10.04	9.65	9.29	8.95	8.63	8.33	8.05	7.79
13,800	36.00	36.00	36.00	36.00	21.46	20.27	19.21	18.31	17.52	16.83	16.21	15.66	15.15	14.70	14.28	13.90	13.54	13.22	12.91	12.62	12.36	12.11	11.87	11.65	11.44	11.24	11.05	10.87	10.65	10.23	9.83	9.46	9.11	8.79	8.49	8.20	7.93
14,000	36.00	36.00	36.00	36.00	21.80	20.65	19.56	18.64	17.83	17.12	16.49	15.92	15.41	14.94	14.52	14.13	13.77	13.43	13.12	12.83	12.56	12.30	12.06	11.83	11.62	11.41	11.22	11.04	10.84	10.42	10.01	9.63	9.28	8.95	8.64	8.35	8.08
14,200	36.00	36.00	36.00	36.00	22.22	21.02	19.91	18.96	18.14	17.41	16.76	16.19	15.66	15.19	14.75	14.35	13.99	13.65	13.33	13.03	12.75	12.49	12.25	12.02	11.80	11.59	11.40	11.21	11.03	10.61	10.19	9.81	9.45	9.11	8.79	8.50	8.22
14,400	36.00	36.00	36.00	36.00	36.00	21.39	20.25	19.28	18.44	17.70	17.04	16.45	15.92	15.43	14.99	14.58	14.21	13.86	13.54	13.23	12.95	12.69	12.44	12.20	11.98	11.77	11.57	11.38	11.20	10.79	10.37	9.98	9.61	9.27	8.95	8.64	8.36
14,600	36.00	36.00	36.00	36.00	36.00	21.66	20.60	19.60	18.74	17.99	17.31	16.71	16.17	15.67	15.22	14.81	14.43	14.07	13.74	13.44	13.15	12.88	12.63	12.39	12.16	11.95	11.74	11.55	11.37	10.98	10.55	10.15	9.77	9.42	9.10	8.79	8.50
14,800	36.00	36.00	36.00	36.00	36.00	21.89	20.94	19.92	19.05	18.27	17.59	16.97	16.42	15.92	15.46	15.04	14.65	14.29	13.95	13.64	13.35	13.07	12.81	12.57	12.34	12.12	11.92	11.72	11.53	11.17	10.73	10.32	9.94	9.58	9.25	8.93	8.64
15,000	36.00	36.00	36.00	36.00	36.00	22.17	21.28	20.24	19.34	18.56	17.86	17.23	16.67	16.16	15.69	15.26	14.86	14.50	14.16	13.84	13.54	13.26	13.00	12.75	12.52	12.30	12.09	11.89	11.70	11.35	10.90	10.49	10.10	9.74	9.40	9.08	8.78
15,200	36.00	36.00	36.00	36.00	36.00	22.48	21.57	20.56	19.64	18.84	18.13	17.49	16.92	16.40	15.92	15.48	15.08	14.71	14.36	14.04	13.74	13.45	13.19	12.94	12.70	12.47	12.26	12.06	11.87	11.53	11.08	10.66	10.26	9.89	9.55	9.22	8.92
15,400	36.00	36.00	36.00	36.00	36.00	22.95	21.79	20.87	19.94	19.12	18.40	17.75	17.17	16.64	16.15	15.71	15.30	14.92	14.57	14.24	13.93	13.65	13.37	13.12	12.88	12.65	12.43	12.23	12.03	11.72	11.25	10.82	10.42	10.05	9.70	9.37	9.06
15,600	36.00	36.00	36.00	36.00	36.00	36.00	22.00	21.18	20.23	19.40	18.66	18.01	17.41	16.87	16.38	15.93	15.51	15.13	14.77	14.44	14.13	13.83	13.56	13.30	13.06	12.82	12.60	12.40	12.20	11.90	11.43	10.99	10.58	10.20	9.84	9.51	9.19
15,800	36.00	36.00	36.00	36.00	36.00	36.00	22.19	21.49	20.53	19.68	18.93	18.26	17.66	17.11	16.61	16.15	15.73	15.34	14.98	14.64	14.32	14.02	13.74	13.48	13.23	13.00	12.78	12.56	12.36	12.08	11.60	11.16	10.74	10.35	9.99	9.65	9.33
16,000	36.00	36.00	36.00	36.00	36.00	36.00	22.39	21.75	20.82	19.96	19.19	18.51	17.90	17.34	16.84	16.37	15.94	15.55	15.18	14.83	14.51	14.21	13.93	13.66	13.41	13.17	12.95	12.73	12.53	12.26	11.77	11.32	10.90	10.51	10.14	9.79	9.47
16,200	36.00	36.00	36.00	36.00	36.00	36.00	22.62	22.01	21.10	20.23	19.46	18.76	18.14	17.58	17.06	16.59	16.16	15.75	15.38	15.03	14.71	14.40	14.11	13.84	13.59	13.34	13.12	12.90	12.69	12.43	11.95	11.49	11.06	10.66	10.28	9.93	9.60
16,400	36.00	36.00	36.00	36.00	36.00	36.00	22.91	22.15	21.39	20.50	19.72	19.01	18.38	17.81	17.29	16.81	16.37	15.96	15.58	15.23	14.90	14.59	14.30	14.02	13.76	13.52	13.28	13.06	12.85	12.61	12.11	11.65	11.21	10.81	10.43	10.07	9.74
16,600	36.00	36.00	36.00	36.00	36.00	36.00	23.29	22.29	21.67	20.77	19.97	19.26	18.62	18.04	17.51	17.03	16.58	16.16	15.78	15.42	15.09	14.77	14.48	14.20	13.94	13.69	13.45	13.23	13.02	12.79	12.28	11.81	11.37	10.96	10.57	10.21	9.87
16,800	36.00	36.00	36.00	36.00	36.00	36.00	23.81	22.43	21.95	21.04	20.23	19.51	18.86	18.27	17.73	17.24	16.79	16.37	15.98	15.62	15.28	14.96	14.66	14.38	14.11	13.86	13.62	13.39	13.18	12.97	12.45	11.97	11.53	11.11	10.72	10.35	10.01
17,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	22.60	22.11	21.30	20.49	19.75	19.10	18.50	17.95	17.46	17.00	16.57	16.18	15.81	15.47	15.14	14.84	14.56	14.29	14.03	13.79	13.56	13.34	13.13	12.62	12.13	11.68	11.26	10.86	10.49	10.14
17,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	22.78	22.24	21.57	20.74	20.00	19.33	18.73	18.17	17.67	17.20	16.77	16.37	16.00	15.65	15.33	15.02	14.73	14.46	14.20	13.96	13.72	13.50	13.29	12.78	12.29	11.83	11.40	11.00	10.63	10.27
17,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	22.96	22.37	21.83	20.99	20.24	19.56	18.95	18.39	17.88	17.41	16.98	16.57	16.19	15.84	15.51	15.20	14.91	14.63	14.37	14.12	13.89	13.66	13.44	12.95	12.45	11.99	11.55	11.14	10.76	10.40
17,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	23.19	22.51	22.05	21.24	20.48	19.80	19.18	18.61	18.09	17.62	17.18	16.77	16.39	16.03	15.70	15.38	15.09	14.81	14.54	14.29	14.05	13.83	13.60	13.11	12.61	12.14	11.70	11.28	10.90	10.54
17,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	23.43	22.64	22.21	21.49	20.72	20.03	19.40	18.83	18.30	17.82	17.38	16.96	16.58	16.22	15.88	15.56	15.26	14.98	14.71	14.46	14.22	13.99	13.76	13.28	12.76	12.29	11.84	11.42	11.03	10.66
18,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	23.74	22.78	22.37	21.73	20.96	20.26	19.62	19.04	18.51	18.03	17.58	17.16	16.77	16.40	16.06	15.74	15.44	15.15	14.88	14.62	14.38	14.15	13.92	13.44	12.92	12.44	11.99	11.56	11.17	10.79
18,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.10	22.92	22.52	21.98	21.19	20.49	19.84	19.26	18.72	18.23	17.77	17.35	16.96	16.59	16.24	15.92	15.61	15.32	15.05	14.79	14.54	14.31	14.08	13.60	13.08	12.59	12.13	11.70	11.30	10.92
18,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.70	23.08	22.62	22.22	21.43	20.71	20.06	19.47	18.93	18.43	17.97	17.54	17.14	16.77	16.42	16.09	15.78	15.49	15.21	14.95	14.70	14.47	14.24	13.76	13.23	12.73	12.27	11.84	11.43	11.05
18,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	23.26	22.73	22.46	21.66	20.94	20.28	19.68	19.14	18.63	18.17	17.74	17.33	16.96	16.60	16.27	15.96	15.66	15.38	15.12	14.86	14.62	14.40	13.92	13.38	12.88	12.41	11.98	11.57	11.18
18,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	23.44	22.83	22.57	21.89	21.16	20.50	19.90	19.34	18.83	18.36	17.93	17.52	17.14	16.78	16.45	16.13	15.83	15.55	15.28	15.03	14.78	14.55	14.08	13.53	13.03	12.56	12.11	11.70	11.31
19,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	23.65	22.94	22.66	22.12	21.38	20.71	20.11	19.55	19.03	18.56	18.12	17.70	17.32	16.96	16.62	16.30	16.00	15.71	15.44	15.19	14.94	14.71	14.23	13.68	13.17	12.69	12.25	11.83	11.43
19,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	23.89	23.05	22.74	22.35	21.60	20.93	20.31	19.75	19.23	18.75	18.31	17.89	17.50	17.14	16.80	16.47	16.17	15.88	15.61	15.35	15.10	14.86	14.39	13.83	13.32	12.83	12.38	11.96	11.56
19,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.17	23.19	22.83	22.53	21.82	21.14	20.52	19.95	19.43	18.94	18.49	18.07	17.68	17.31	16.97	16.64	16.34	16.05	15.77	15.51	15.26	15.02	14.54	13.98	13.46	12.97	12.52	12.09	11.68
19,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.49	23.32	22.92	22.63	22.04	21.35	20.73	20.15	19.62	19.13	18.68	18.26	17.86	17.49	17.14	16.81	16.50	16.21	15.93	15.66	15.41	15.17	14.69	14.13	13.60	13.11	12.65	12.22	11.81
19,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.92	23.45	23.00	22.74	22.25	21.56	20.93	20.35	19.82	19.33	18.87	18.44	18.04	17.67	17.31	16.98	16.67	16.37	16.09	15.82	15.57	15.33	14.85	14.28	13.74	13.25	12.78	12.34	11.93
20,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.54	23.61	23.11	22.84	22.47	21.77	21.13	20.55	20.01	19.52	19.05	18.62	18.22	17.84	17.49	17.15	16.84	16.54	16.25	15.98	15.72	15.48	15.00	14.42	13.88	13.38	12.91	12.47	12.06
20,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	23.79	23.21	22.94	22.63	21.98	21.34	20.75	20.21	19.70	19.24	18.80	18.40	18.02	17.66	17.32	17.00	16.70	16.41	16.14	15.88	15.63	15.15	14.57	14.02	13.52	13.04	12.60	12.18
20,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	23.96	23.31	23.03	22.79	22.18	21.54	20.95	20.40	19.89	19.42	18.99	18.58	18.19	17.83	17.49	17.17	16.86	16.57	16.30	16.04	15.79	15.30	14.71	14.16	13.65	13.17	12.72	12.30
20,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.18	23.41	23.11	22.94	22.39	21.74	21.14	20.59	20.08	19.61	19.16	18.75	18.36	18.00	17.66	17.33	17.02	16.73	16.45	16.19	15.94	15.45	14.85	14.30	13.78	13.30	12.84	12.42
20,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.42	23.52	23.19	23.04	22.59	21.94	21.33	20.78	20.27	19.79	19.34	18.93	18.54	18.17	17.82	17.50	17.18	16.89	16.61	16.34	16.09	15.60	15.00	14.44	13.92	13.43	12.97	12.54
21,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.70	23.65	23.28	23.11	22.79	22.13	21.53	20.97	20.45	19.97	19.52	19.10	18.71	18.34	17.99	17.66	17.34	17.05	16.77	16.50	16.24	15.74	15.14	14.57	14.05	13.55	13.09	12.66
21,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.03	23.78	23.36	23.18	23.00	22.33	21.72	21.16	20.63	20.15	19.70	19.27	18.88	18.50	18.15	17.82	17.50	17.21	16.92	16.65	16.39	15.89	15.28	14.71	14.18	13.68	13.21	12.77
21,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.47	23.91	23.44	23.25	23.08	22.52	21.91	21.34	20.82	20.33	19.87	19.45	19.05	18.67	18.32	17.98	17.66	17.36	17.08	16.80	16.54	16.03	15.41	14.84	14.31	13.80	13.33	12.89
21,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.13	24.05	23.52	23.32	23.15	22.72	22.10	21.53	21.00	20.51	20.05	19.62	19.22	18.84	18.48	18.14	17.82	17.52	17.23	16.96	16.69	16.17	15.55	14.98	14.43	13.93	13.45	13.01
21,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.22	23.63	23.39	23.23	22.91	22.28	21.71	21.18	20.68	20.22	19.79	19.38	19.00	18.64	18.30	17.98	17.67	17.38	17.11	16.84	16.31	15.69	15.11	14.56	14.05	13.57	13.12
22,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.38	23.73	23.46	23.31	23.06	22.47	21.89	21.36	20.86	20.39	19.96	19.55	19.17	18.80	18.46	18.14	17.83	17.54	17.26	16.99	16.45	15.82	15.23	14.69	14.17	13.69	13.24
22,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.57	23.83	23.53	23.38	23.16	22.66	22.07	21.54	21.03	20.57	20.13	19.72	19.33	18.97	18.62	18.29	17.99	17.69	17.41	17.14	16.59	15.96	15.36	14.81	14.29	13.81	13.35
22,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.79	23.93	23.61	23.46	23.27	22.84	22.25	21.71	21.21	20.74	20.30	19.88	19.50	19.13	18.78	18.45	18.14	17.84	17.56	17.29	16.72	16.09	15.49	14.94	14.41	13.93	13.47
22,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.03	24.04	23.69	23.53	23.38	23.02	22.43	21.89	21.38	20.91	20.47	20.05	19.66	19.29	18.94	18.61	18.29	17.99	17.71	17.43	16.86	16.22	15.62	15.06	14.53	14.04	13.58
22,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.34	24.17	23.76	23.60	23.48	23.20	22.61	22.06	21.55	21.08	20.63	20.21	19.82	19.44	19.09	18.76	18.44	18.14	17.85	17.58	16.99	16.35	15.74	15.18	14.65	14.16	13.69
23,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.72	24.30	23.84	23.66	23.55	23.38	22.79	22.24	21.72	21.24	20.80	20.37	19.98	19.60	19.25	18.91	18.59	18.29	18.00	17.72	17.12	16.48	15.87	15.30	14.77	14.27	13.80
23,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.23	24.43	23.92	23.73	23.61	23.52	22.96	22.41	21.89	21.41	20.96	20.54	20.14	19.76	19.40	19.07	18.74	18.44	18.15	17.87	17.25	16.60	15.99	15.42	14.89	14.38	13.91
23,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	27.09	24.58	24.00	23.79	23.68	23.58	23.13	22.58	22.06	21.58	21.12	20.70	20.29	19.92	19.56	19.22	18.89	18.59	18.29	18.01	17.38	16.73	16.11	15.54	15.00	14.50	14.02
23,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.74	24.10	23.86	23.74	23.64	23.30	22.75	22.23	21.74	21.28	20.86	20.45	20.07	19.71	19.37	19.04	18.73	18.44	18.16	17.51	16.85	16.23	15.66	15.12	14.61	14.13
23,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	24.91	24.19	23.92	23.80	23.71	23.48	22.91	22.39	21.90	21.45	21.02	20.61	20.23	19.86	19.52	19.19	18.88	18.59	18.30	17.64	16.97	16.35	15.77	15.23	14.72	14.23
24,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.10	24.29	23.99	23.86	23.77	23.57	23.08	22.56	22.07	21.61	21.17	20.76	20.38	20.02	19.67	19.34	19.03	18.73	18.44	17.76	17.09	16.47	15.89	15.34	14.83	14.34
24,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.32	24.38	24.07	23.93	23.83	23.66	23.25	22.72	22.23	21.76	21.33	20.92	20.53	20.17	19.82	19.49	19.17	18.87	18.58	17.88	17.21	16.59	16.00	15.45	14.93	14.45
24,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.55	24.48	24.15	23.99	23.89	23.74	23.41	22.88	22.39	21.92	21.49	21.07	20.68	20.32	19.97	19.63	19.32	19.02	18.71	18.01	17.33	16.70	16.11	15.56	15.04	14.55
24,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.84	24.60	24.23	24.05	23.96	23.82	23.56	23.04	22.55	22.08	21.64	21.23	20.84	20.47	20.11	19.78	19.46	19.16	18.84	18.12	17.45	16.82	16.22	15.67	15.15	14.65
24,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.19	24.73	24.31	24.12	24.02	23.91	23.69	23.20	22.70	22.23	21.79	21.38	20.99	20.61	20.26	19.93	19.61	19.30	18.97	18.24	17.56	16.93	16.33	15.77	15.25	14.76
25,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.64	24.86	24.39	24.18	24.08	23.99	23.82	23.36	22.86	22.39	21.95	21.53	21.14	20.76	20.41	20.07	19.75	19.44	19.09	18.36	17.68	17.04	16.44	15.88	15.35	14.86
25,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	27.34	24.99	24.47	24.25	24.14	24.05	23.95	23.52	23.02	22.55	22.10	21.68	21.28	20.91	20.55	20.21	19.89	19.58	19.21	18.48	17.79	17.15	16.55	15.99	15.46	14.96
25,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.15	24.55	24.31	24.21	24.12	24.04	23.67	23.17	22.70	22.25	21.83	21.43	21.06	20.70	20.36	20.03	19.72	19.33	18.59	17.90	17.26	16.66	16.09	15.56	15.06
25,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.32	24.65	24.38	24.27	24.18	24.10	23.83	23.32	22.85	22.40	21.98	21.58	21.20	20.84	20.50	20.18	19.86	19.44	18.70	18.02	17.37	16.76	16.19	15.66	15.15
25,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.49	24.75	24.44	24.33	24.24	24.16	23.99	23.48	23.00	22.55	22.13	21.73	21.35	20.99	20.64	20.32	20.00	19.56	18.81	18.12	17.48	16.87	16.29	15.76	15.25
26,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.71	24.84	24.51	24.40	24.30	24.21	24.06	23.63	23.15	22.70	22.27	21.87	21.49	21.13	20.78	20.46	20.14	19.67	18.93	18.23	17.58	16.97	16.39	15.85	15.35
26,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.94	24.94	24.59	24.46	24.36	24.27	24.13	23.78	23.30	22.85	22.42	22.02	21.63	21.27	20.93	20.59	20.28	19.78	19.03	18.33	17.68	17.07	16.50	15.95	15.44
26,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.22	25.04	24.67	24.52	24.42	24.33	24.21	23.93	23.45	23.00	22.57	22.16	21.78	21.41	21.06	20.73	20.42	19.89	19.14	18.44	17.78	17.17	16.59	16.05	15.54
26,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.53	25.16	24.75	24.59	24.48	24.39	24.28	24.05	23.59	23.14	22.71	22.30	21.92	21.55	21.20	20.87	20.55	20.00	19.24	18.54	17.89	17.27	16.69	16.14	15.63
26,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.95	25.28	24.82	24.65	24.54	24.45	24.35	24.15	23.74	23.28	22.85	22.45	22.06	21.69	21.34	21.01	20.69	20.10	19.35	18.64	17.99	17.37	16.78	16.24	15.72
27,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	27.56	25.40	24.90	24.72	24.61	24.51	24.42	24.26	23.89	23.43	23.00	22.59	22.20	21.83	21.48	21.14	20.82	20.21	19.45	18.74	18.08	17.46	16.88	16.33	15.81
27,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.52	24.98	24.79	24.67	24.57	24.49	24.36	24.03	23.57	23.14	22.73	22.34	21.97	21.62	21.28	20.96	20.31	19.55	18.84	18.18	17.56	16.97	16.42	15.90
27,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.68	25.07	24.85	24.73	24.63	24.55	24.46	24.17	23.71	23.28	22.87	22.48	22.11	21.75	21.42	21.09	20.41	19.65	18.94	18.27	17.65	17.07	16.51	15.99
27,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.83	25.17	24.92	24.80	24.69	24.61	24.53	24.31	23.85	23.42	23.01	22.61	22.24	21.89	21.55	21.23	20.51	19.75	19.04	18.37	17.74	17.15	16.60	16.08
27,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	25.99	25.27	24.98	24.86	24.76	24.67	24.59	24.45	23.99	23.56	23.14	22.75	22.38	22.02	21.68	21.36	20.61	19.84	19.13	18.47	17.83	17.24	16.69	16.16
28,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.21	25.37	25.06	24.92	24.82	24.73	24.65	24.54	24.13	23.69	23.28	22.89	22.51	22.16	21.82	21.49	20.70	19.94	19.22	18.56	17.93	17.33	16.77	16.25
28,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.45	25.47	25.14	24.98	24.88	24.79	24.71	24.60	24.27	23.83	23.42	23.02	22.65	22.29	21.95	21.59	20.80	20.03	19.32	18.64	18.02	17.42	16.86	16.33
28,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.75	25.59	25.22	25.05	24.94	24.84	24.76	24.67	24.41	23.97	23.55	23.16	22.78	22.42	22.08	21.69	20.89	20.12	19.41	18.73	18.10	17.51	16.95	16.42
28,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	27.09	25.72	25.30	25.12	25.00	24.90	24.82	24.73	24.53	24.10	23.69	23.29	22.91	22.55	22.21	21.79	20.98	20.21	19.50	18.82	18.19	17.59	17.03	16.50
28,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	27.56	25.84	25.38	25.19	25.06	24.96	24.88	24.79	24.61	24.24	23.82	23.42	23.04	22.68	22.34	21.88	21.07	20.30	19.58	18.91	18.27	17.67	17.11	16.58
29,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	28.31	25.96	25.45	25.25	25.13	25.02	24.94	24.85	24.70	24.37	23.95	23.55	23.17	22.81	22.47	21.98	21.15	20.39	19.67	19.00	18.35	17.76	17.19	16.66
29,200	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.11	25.54	25.32	25.19	25.08	24.99	24.91	24.78	24.50	24.08	23.68	23.30	22.94	22.60	22.07	21.24	20.48	19.75	19.08	18.44	17.84	17.27	16.74
29,400	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.27	25.63	25.39	25.25	25.14	25.05	24.98	24.87	24.63	24.21	23.81	23.43	23.07	22.72	22.15	21.32	20.56	19.83	19.15	18.52	17.92	17.35	16.82
29,600	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.43	25.72	25.46	25.31	25.21	25.11	25.04	24.95	24.76	24.34	23.94	23.56	23.20	22.85	22.23	21.41	20.63	19.92	19.23	18.60	18.00	17.43	16.89
29,800	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.61	25.81	25.53	25.38	25.27	25.17	25.10	25.03	24.89	24.47	24.07	23.69	23.32	22.98	22.31	21.49	20.71	20.00	19.31	18.67	18.07	17.51	16.97
30,000	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	26.82	25.90	25.61	25.44	25.33	25.23	25.15	25.08	25.01	24.60	24.20	23.82	23.45	23.10	22.39	21.57	20.79	20.07	19.39	18.75	18.15	17.58	17.05

Table 5 Wild Rice River Control Structure (WRRCS) Gate Opening (ft) - Part D

Flow through WRRCS (cfs)	Staging Area Elevation at Wild Rice River, $Z_{STAGING\text{-}AREA\text{-}WRR}$ (ft)												
	922.6	922.8	923.0	923.2	923.4	923.6	923.8	924.0	924.2	924.4	924.6	924.8	925.0
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
700	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23
800	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
900	0.31	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30
1,000	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.33	0.33	0.33
1,100	0.38	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
1,200	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.40	0.40	0.40
1,300	0.45	0.45	0.45	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.43	0.43	0.43
1,400	0.48	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.47	0.47	0.47
1,500	0.52	0.52	0.51	0.51	0.51	0.51	0.51	0.51	0.50	0.50	0.50	0.50	0.50
1,600	0.55	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53
1,700	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.57	0.57	0.57	0.57	0.56
1,800	0.62	0.62	0.62	0.62	0.61	0.61	0.61	0.61	0.61	0.60	0.60	0.60	0.60
1,900	0.66	0.65	0.65	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.64	0.63	0.63
2,000	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.67	0.67	0.66
2,100	0.72	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.70	0.70	0.70	0.70
2,200	0.76	0.76	0.75	0.75	0.75	0.75	0.74	0.74	0.74	0.74	0.74	0.73	0.73
2,300	0.79	0.79	0.79	0.79	0.78	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.76
2,400	0.83	0.83	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.80	0.80	0.80	0.80
2,500	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.83	0.83
2,600	0.90	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.87	0.87	0.87	0.87	0.86
2,700	0.93	0.93	0.93	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.90	0.90	0.90
2,800	0.97	0.96	0.96	0.96	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.93	0.93
2,900	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.96
3,000	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.00	1.00	1.00
3,100	1.07	1.07	1.06	1.06	1.06	1.05	1.05	1.05	1.04	1.04	1.04	1.03	1.03
3,200	1.10	1.10	1.10	1.09	1.09	1.09	1.08	1.08	1.08	1.07	1.07	1.07	1.06
3,300	1.14	1.13	1.13	1.13	1.12	1.12	1.12	1.11	1.11	1.11	1.10	1.10	1.10
3,400	1.17	1.17	1.17	1.16	1.16	1.15	1.15	1.15	1.14	1.14	1.14	1.13	1.13
3,500	1.21	1.20	1.20	1.20	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17	1.16
3,600	1.24	1.24	1.23	1.23	1.23	1.22	1.22	1.21	1.21	1.21	1.20	1.20	1.20
3,700	1.28	1.27	1.27	1.26	1.26	1.26	1.25	1.25	1.24	1.24	1.24	1.23	1.23
3,800	1.31	1.31	1.30	1.30	1.29	1.29	1.29	1.28	1.28	1.27	1.27	1.27	1.26
3,900	1.35	1.34	1.34	1.33	1.33	1.32	1.32	1.32	1.31	1.31	1.30	1.30	1.30
4,000	1.38	1.38	1.37	1.37	1.36	1.36	1.35	1.35	1.35	1.34	1.34	1.33	1.33
4,100	1.41	1.41	1.41	1.40	1.40	1.39	1.39	1.38	1.38	1.37	1.37	1.37	1.36
4,200	1.45	1.44	1.44	1.43	1.43	1.43	1.42	1.42	1.41	1.41	1.40	1.40	1.40
4,300	1.48	1.48	1.47	1.47	1.46	1.46	1.46	1.45	1.45	1.44	1.44	1.43	1.43
4,400	1.52	1.51	1.51	1.50	1.50	1.49	1.49	1.48	1.48	1.48	1.47	1.47	1.46
4,500	1.55	1.55	1.54	1.54	1.53	1.53	1.52	1.52	1.51	1.51	1.50	1.50	1.50
4,600	1.59	1.58	1.58	1.57	1.57	1.56	1.56	1.55	1.55	1.54	1.54	1.53	1.53
4,700	1.62	1.62	1.61	1.61	1.60	1.60	1.59	1.59	1.58	1.58	1.57	1.57	1.56
4,800	1.66	1.65	1.64	1.64	1.63	1.63	1.62	1.62	1.61	1.61	1.60	1.60	1.59
4,900	1.69	1.68	1.68	1.67	1.67	1.66	1.66	1.65	1.65	1.64	1.64	1.63	1.63
5,000	1.72	1.72	1.71	1.71	1.70	1.70	1.69	1.69	1.68	1.68	1.67	1.67	1.66
5,200	1.79	1.79	1.78	1.78	1.77	1.76	1.76	1.75	1.75	1.74	1.74	1.73	1.73
5,400	1.86	1.86	1.85	1.84	1.84	1.83	1.83	1.82	1.82	1.81	1.80	1.80	1.79
5,600	1.93	1.92	1.92	1.91	1.91	1.90	1.89	1.89	1.88	1.88	1.87	1.87	1.86
5,800	2.00	1.99	1.99	1.98	1.97	1.97	1.96	1.96	1.95	1.94	1.94	1.93	1.93
6,000	2.07	2.06	2.06	2.05	2.04	2.04	2.03	2.02	2.02	2.01	2.01	2.00	1.99
6,200	2.14	2.13	2.12	2.12	2.11	2.10	2.10	2.09	2.08	2.08	2.07	2.07	2.06
6,400	2.21	2.20	2.19	2.19	2.18	2.17	2.16	2.16	2.15	2.15	2.14	2.13	2.13
6,600	2.28	2.27	2.26	2.25	2.25	2.24	2.23	2.23	2.22	2.21	2.21	2.20	2.19
6,800	2.34	2.34	2.33	2.32	2.31	2.31	2.30	2.29	2.29	2.28	2.27	2.27	2.26
7,000	2.41	2.41	2.40	2.39	2.38	2.37	2.37	2.36	2.35	2.35	2.34	2.33	2.32
7,200	2.48	2.47	2.47	2.46	2.45	2.44	2.44	2.43	2.42	2.41	2.41	2.40	2.39
7,400	2.55	2.54	2.53	2.53	2.52	2.51	2.50	2.49	2.49	2.48	2.47	2.46	2.46
7,600	2.63	2.62	2.60	2.59	2.59	2.58	2.57	2.56	2.55	2.55	2.54	2.53	2.52
7,800	2.76	2.72	2.69	2.67	2.65	2.65	2.64	2.63	2.62	2.61	2.61	2.60	2.59
8,000	2.90	2.84	2.78	2.75	2.72	2.71	2.71	2.70	2.69	2.68	2.67	2.66	2.66
8,200	3.04	2.98	2.91	2.85	2.79	2.78	2.77	2.76	2.76	2.75	2.74	2.73	2.72
8,400	3.18	3.12	3.05	2.98	2.91	2.87	2.85	2.83	2.82	2.81	2.81	2.80	2.79
8,600	3.33	3.26	3.18	3.11	3.04	2.98	2.94	2.91	2.89	2.88	2.87	2.86	2.85
8,800	3.48	3.41	3.33	3.25	3.18	3.11	3.04	2.98	2.96	2.95	2.94	2.93	2.92
9,000	3.64	3.57	3.49	3.40	3.33	3.25	3.18	3.11	3.05	3.02	3.01	3.00	2.99
9,200	3.82	3.74	3.66	3.57	3.48	3.40	3.32	3.25	3.18	3.13	3.10	3.07	3.05
9,400	4.01	3.92	3.83	3.73	3.65	3.56	3.48	3.39	3.32	3.25	3.19	3.15	3.12
9,600	4.19	4.11	4.00	3.91	3.81	3.72	3.63	3.55	3.46	3.39	3.32	3.24	3.19
9,800	4.38	4.29	4.19	4.08	3.98	3.88	3.79	3.70	3.61	3.53	3.45	3.38	3.31
10,000	4.58	4.48	4.37	4.26	4.15	4.05	3.95	3.85	3.76	3.68	3.59	3.52	3.44
10,200	4.78	4.67	4.55	4.43	4.32	4.21	4.11	4.00	3.91	3.82	3.74	3.65	3.57
10,400	4.98	4.86	4.74	4.62	4.50	4.38	4.27	4.17	4.07	3.97	3.88	3.79	3.71
10,600	5.17	5.06	4.93	4.79	4.67	4.55	4.43	4.32	4.22	4.12	4.02	3.93	3.84
10,800	5.37	5.25	5.10	4.96	4.83	4.70	4.58	4.47	4.36	4.25	4.15	4.06	3.97
11,000	5.56	5.42	5.27	5.13	4.99	4.86	4.73	4.61	4.50	4.39	4.28	4.18	4.09
11,200	5.74	5.59	5.44	5.29	5.14	5.01	4.87	4.75	4.63	4.52	4.41	4.31	4.21
11,400	5.91	5.76	5.60	5.44	5.29	5.15	5.01	4.88	4.76	4.64	4.53	4.42	4.32
11,600	6.08	5.92	5.75	5.58	5.43	5.28	5.14	5.01	4.88	4.76	4.65	4.54	4.43
11,800	6.24	6.07	5.89	5.72	5.57	5.41	5.27	5.13	5.00	4.88	4.76	4.65	4.54
12,000	6.40	6.22	6.04	5.86	5.70	5.54	5.39	5.25	5.12	4.99	4.87	4.75	4.64
12,200	6.55	6.36	6.17	6.00	5.83	5.67	5.52	5.37	5.23	5.10	4.98	4.86	4.74
12,400	6.70	6.50	6.31	6.13	5.96	5.79	5.64	5.49	5.35	5.21	5.08	4.96	4.84
12,600	6.84	6.64	6.45	6.26	6.08	5.91	5.75	5.60	5.46	5.32	5.19	5.06	4.94
12,800	6.99	6.78	6.58	6.39	6.21	6.03	5.87	5.71	5.57	5.43	5.29	5.16	5.04
13,000	7.13	6.91	6.71	6.51	6.33	6.15	5.99	5.83	5.67	5.53	5.39	5.26	5.14
13,200	7.27	7.05	6.84	6.64	6.45	6.27	6.10	5.94	5.78	5.64	5.50	5.36	5.23
13,400	7.41	7.19	6.97	6.77	6.57	6.39	6.21	6.05	5.89	5.74	5.60	5.46	5.33
13,600	7.55	7.32	7.10	6.89	6.69	6.51	6.33	6.16	6.00	5.84	5.70	5.56	5.43
13,800	7.69	7.45	7.23	7.01	6.81	6.62	6.44	6.27	6.10	5.95	5.80	5.66	5.52
14,000	7.82	7.58	7.35	7.14	6.93	6.74	6.55	6.38	6.21	6.05	5.90	5.75	5.62
14,200	7.96	7.71	7.48	7.26	7.05	6.85	6.66	6.49	6.32	6.15	6.00	5.85	5.71
14,400	8.10	7.85	7.61	7.38	7.17	6.97	6.78	6.59	6.42	6.26	6.10	5.95	5.81
14,600	8.23	7.98	7.73	7.51	7.29	7.08	6.89	6.70	6.53	6.36	6.20	6.04	5.90
14,800	8.37	8.11	7.86	7.63	7.41	7.20	7.00	6.81	6.63	6.46	6.30	6.14	5.99
15,000	8.50	8.24	7.99	7.75	7.52	7.31	7.11	6.92	6.73	6.56	6.40	6.24	6.09
15,200	8.63	8.37	8.11	7.87	7.64	7.43	7.22	7.02	6.84	6.66	6.49	6.33	6.18
15,400	8.77	8.50	8.24	7.99	7.76	7.54	7.33	7.13	6.94	6.76	6.59	6.43	6.27
15,600	8.90	8.62	8.36	8.11	7.87	7.65	7.44	7.24	7.05	6.86	6.69	6.52	6.36
15,800	9.03	8.75	8.48	8.23	7.99	7.76	7.55	7.34	7.15	6.96	6.79	6.62	6.46
16,000	9.16	8.88	8.61	8.35	8.11	7.87	7.66	7.45	7.25	7.06	6.88	6.71	6.55
16,200	9.30	9.00	8.73	8.47	8.22	7.99	7.76	7.55	7.35	7.16	6.98	6.81	6.64
16,400	9.43	9.13	8.85	8.59	8.33	8.10	7.87	7.66	7.45	7.26	7.08	6.90	6.73
16,600	9.56	9.26	8.97	8.70	8.45	8.21	7.98	7.76	7.56	7.36	7.17	6.99	6.82
16,800	9.69	9.38	9.09	8.82	8.56	8.32	8.09	7.87	7.66	7.46	7.27	7.09	6.91
17,000	9.81	9.51	9.21	8.94	8.67	8.43	8.19	7.97	7.76	7.56	7.36	7.18	7.01
17,200	9.94	9.63	9.33	9.05	8.79	8.54	8.30	8.07	7.86	7.65	7.46	7.27	7.10
17,400	10.07	9.75	9.45	9.17	8.90	8.65	8.40	8.18	7.96	7.75	7.55	7.36	7.19
17,600	10.19	9.87	9.57	9.28	9.01	8.75	8.51	8.28	8.06	7.85	7.65	7.46	7.28
17,800	10.32	10.00	9.69	9.40	9.12	8.86	8.61	8.38	8.16	7.94	7.74	7.55	7.36
18,000	10.45	10.12	9.81	9.51	9.23	8.97	8.72	8.48	8.26	8.04	7.84	7.64	7.45
18,200	10.57	10.24	9.92	9.63	9.34	9.08	8.82	8.58	8.35	8.14	7.93	7.73	7.54
18,400	10.70	10.36	10.04	9.74	9.45	9.18	8.93	8.68	8.45	8.23	8.02	7.82	7.63
18,600	10.82	10.48	10.16	9.85	9.56	9.29	9.03	8.78	8.55	8.33	8.12	7.91	7.72
18,800	10.94	10.60	10.27	9.96	9.67	9.40	9.13	8.88	8.65	8.42	8.21	8.00	7.81
19,000	11.07	10.72	10.39	10.07	9.78	9.50	9.24	8.98	8.74	8.52	8.30	8.09	7.90
19,200	11.19	10.83	10.50	10.19	9.89	9.61	9.34	9.08	8.84	8.61	8.39	8.18	7.98
19,400	11.31	10.95	10.61	10.30	10.00	9.71	9.44	9.18	8.94	8.71	8.48	8.27	8.07
19,600	11.43	11.07	10.73	10.41	10.10	9.81	9.54	9.28	9.04	8.80	8.58	8.36	8.16
19,800	11.55	11.18	10.84	10.52	10.21	9.92	9.64	9.38	9.13	8.89	8.67	8.45	8.25
20,000	11.67	11.30	10.95	10.62	10.31	10.02	9.74	9.48	9.23	8.99	8.76	8.54	8.33
20,200	11.78	11.41	11.06	10.73	10.42	10.12	9.84	9.58	9.32	9.08	8.85	8.63	8.42
20,400	11.90	11.53	11.18	10.84	10.53	10.23	9.94	9.67	9.42	9.17	8.94	8.72	8.50
20,600	12.02	11.64	11.29	10.95	10.63	10.33	10.04	9.77	9.51	9.26	9.03	8.80	8.59
20,800	12.13	11.76	11.40	11.06	10.73	10.43	10.14	9.87	9.60	9.35	9.12	8.89	8.67
21,000	12.25	11.87	11.51	11.16	10.84	10.53	10.24	9.96	9.70	9.45	9.21	8.98	8.76
21,200	12.37	11.98	11.61	11.27	10.94	10.63	10.33	10.06	9.79	9.53	9.29	9.06	8.84
21,400	12.48	12.09	11.72	11.37	11.04	10.73	10.43	10.15	9.88	9.62	9.38	9.15	8.92
21,600	12.59	12.20	11.83	11.48	11.14	10.83	10.53	10.24	9.97	9.71	9.47	9.23	9.01
21,800	12.70	12.31	11.94	11.58	11.24	10.93	10.62	10.33	10.06	9.80	9.55	9.32	9.09
22,000	12.82	12.42	12.04	11.68	11.34	11.02	10.72	10.43	10.15	9.89	9.64	9.40	9.17
22,200	12.93	12.53	12.15	11.79	11.44	11.12	10.81	10.52	10.24	9.98	9.72	9.48	9.25
22,400	13.04	12.63	12.25	11.89	11.54	11.21	10.90	10.61	10.33	10.06	9.81	9.57	9.33
22,600	13.15	12.74	12.35	11.99	11.64	11.31	11.00	10.70	10.42	10.15	9.89	9.65	9.41
22,800	13.26	12.85	12.46	12.09	11.74	11.41	11.09	10.79	10.51	10.23	9.98	9.73	9.49
23,000	13.36	12.95	12.56	12.19	11.83	11.50	11.18	10.88	10.59	10.32	10.06	9.81	9.57
23,200	13.47	13.06	12.66	12.28	11.93	11.59	11.27	10.97	10.68	10.40	10.14	9.89	9.65
23,400	13.58	13.16	12.76	12.38	12.02	11.68	11.36	11.06	10.77	10.49	10.22	9.97	9.73
23,600	13.68	13.26	12.86	12.48	12.12	11.78	11.45	11.14	10.85	10.57	10.31	10.05	9.81
23,800	13.79	13.36	12.96	12.57	12.21	11.87	11.54	11.23	10.94	10.66	10.39	10.13	9.89
24,000	13.89	13.46	13.05	12.67	12.30	11.96	11.63	11.32	11.02	10.74	10.47	10.21	9.97
24,200	13.99	13.56	13.15	12.76	12.40	12.05	11.72	11.40	11.11	10.82	10.55	10.29	10.04
24,400	14.09	13.66	13.25	12.86	12.49	12.14	11.81	11.49	11.19	10.90	10.63	10.37	10.12
24,600	14.19	13.76	13.34	12.95	12.58	12.23	11.89	11.58	11.27	10.99	10.71	10.45	10.20
24,800	14.29	13.85	13.44	13.04	12.67	12.32	11.98	11.66	11.35	11.07	10.79	10.53	10.27
25,000	14.39	13.95	13.53	13.13	12.76	12.40	12.07	11.74	11.44	11.15	10.87	10.60	10.35
25,200	14.49	14.05	13.62	13.22	12.85	12.49	12.15	11.83	11.52	11.22	10.95	10.68	10.42
25,400	14.59	14.14	13.71	13.31	12.94	12.58	12.23	11.91	11.60	11.30	11.02	10.75	10.50
25,600	14.68	14.23	13.81	13.41	13.03	12.66	12.32	11.99	11.68	11.38	11.10	10.83	10.57
25,800	14.77	14.32	13.90	13.50	13.11	12.75	12.40	12.07	11.76	11.46	11.18	10.91	10.65
26,000	14.87	14.42	13.99	13.58	13.20	12.83	12.49	12.15	11.84	11.54	11.25	10.98	10.72
26,200	14.96	14.51	14.08	13.67	13.28	12.91	12.57	12.23	11.92	11.62	11.33	11.05	10.79
26,400	15.05	14.60	14.16	13.75	13.37	13.00	12.65	12.31	12.00	11.69	11.40	11.13	10.86
26,600	15.14	14.68	14.25	13.84	13.45	13.08	12.73	12.39	12.07	11.77	11.48	11.20	10.94
26,800	15.23	14.77	14.34	13.93	13.53	13.16	12.81	12.47	12.15	11.84	11.55	11.27	11.01
27,000	15.32	14.86	14.42	14.01	13.61	13.24	12.89	12.55	12.22	11.92	11.63	11.34	11.08
27,200	15.41	14.95	14.51	14.09	13.70	13.32	12.97	12.62	12.30	11.99	11.70	11.42	11.15
27,400	15.50	15.03	14.59	14.17	13.78	13.40	13.04	12.70	12.38	12.07	11.77	11.49	11.22
27,600	15.58	15.12	14.67	14.25	13.86	13.48	13.12	12.78	12.45	12.14	11.84	11.56	11.29
27,800	15.67	15.20	14.76	14.33	13.94	13.56	13.19	12.85	12.53	12.21	11.91	11.63	11.36
28,000	15.75	15.28	14.84	14.42	14.02	13.63	13.27	12.93	12.60	12.28	11.99	11.70	11.42
28,200	15.84	15.36	14.92	14.50	14.09	13.71	13.35	13.00	12.67	12.35	12.05	11.76	11.49
28,400	15.92	15.45	15.00	14.57	14.17	13.78	13.42	13.07	12.74	12.43	12.12	11.83	11.56
28,600	16.00	15.53	15.08	14.65	14.24	13.86	13.50	13.14	12.81	12.50	12.19	11.90	11.62
28,800	16.08	15.60	15.15	14.72	14.32	13.93	13.57	13.21	12.88	12.56	12.26	11.97	11.69
29,000	16.16	15.68	15.23	14.80	14.39	14.01	13.64	13.29	12.95	12.63	12.33	12.04	11.76
29,200	16.23	15.76	15.30	14.87	14.47	14.08	13.71	13.36	13.02	12.70	12.39	12.10	11.82
29,400	16.31	15.83	15.38	14.95	14.54	14.15	13.78	13.43	13.09	12.77	12.46	12.17	11.89
29,600	16.39	15.91	15.46	15.02	14.61	14.22	13.85	13.50	13.16	12.83	12.53	12.23	11.95
29,800	16.47	15.99	15.53	15.09	14.68	14.29	13.92	13.56	13.22	12.90	12.59	12.29	12.02
30,000	16.54	16.06	15.60	15.16	14.75	14.36	13.99	13.63	13.29	12.97	12.65	12.36	12.08

Table 6 Red River Control Structure (*RRCS*) Gate Opening (ft) - Part A

Flow through WRRCS (cfs)	Staging Area Elevation at Red River, $Z_{STAGING-AREA-RR}$ (ft)																																		
	891.6	891.8	892.0	892.2	892.4	892.6	892.8	893.0	893.2	893.4	893.6	893.8	894.0	894.2	894.4	894.6	894.8	895.0	895.2	895.4	895.6	895.8	896.0	896.2	896.4	896.6	896.8	897.0	897.2	897.4	897.6	897.8	898.0	898.2	898.4	898.6
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
900	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,000	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,400	6.74	3.19	2.34	1.90	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,500	52.00	52.00	3.89	2.68	2.16	1.85	1.64	1.49	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,600	52.00	52.00	52.00	5.55	3.17	2.43	2.04	1.79	1.62	1.49	1.38	1.30	1.23	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,700	52.00	52.00	52.00	52.00	52.00	4.03	2.82	2.30	1.99	1.78	1.62	1.51	1.40	1.33	1.26	0.20	0.20	1.11	1.07	1.03	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,800	52.00	52.00	52.00	52.00	52.00	52.00	6.19	3.45	2.66	2.24	1.97	1.78	1.64	1.53	1.43	1.36	1.30	1.24	1.18	1.14	1.11	1.07	1.03	1.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,900	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	4.58	3.16	2.56	2.20	1.96	1.79	1.66	1.56	1.47	1.39	1.33	1.27	1.22	1.18	1.14	1.10	1.07	1.04	1.01	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	7.57	3.89	2.95	2.47	2.17	1.96	1.80	1.69	1.58	1.50	1.42	1.36	1.31	1.26	1.21	1.17	1.14	1.11	1.07	1.05	1.02	0.20	0.20	0.20	0.20	0.20	0.20
2,100	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	5.14	3.47	2.79	2.41	2.16	1.97	1.82	1.71	1.61	1.53	1.46	1.39	1.34	1.29	1.25	1.20	1.17	1.14	1.11	1.08	1.05	1.03	1.00	0.20	0.20
2,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	8.27	4.21	3.22	2.71	2.38	2.15	1.98	1.84	1.73	1.64	1.56	1.49	1.42	1.37	1.32	1.28	1.24	1.20	1.17	1.14	1.11	1.09	1.06	1.04
2,300	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	5.50	3.79	3.07	2.64	2.36	2.15	1.99	1.86	1.76	1.66	1.58	1.51	1.45	1.40	1.35	1.31	1.27	1.23	1.20	1.17	1.14	1.12
2,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	8.62	4.59	3.51	2.94	2.58	2.34	2.15	2.00	1.88	1.77	1.68	1.60	1.54	1.48	1.43	1.38	1.34	1.30	1.27	1.23	1.20
2,500	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	5.91	4.07	3.29	2.84	2.55	2.32	2.14	1.99	1.88	1.78	1.70	1.62	1.56	1.51	1.45	1.40	1.37	1.33	1.29
2,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	8.49	4.78	3.70	3.13	2.77	2.50	2.29	2.12	1.99	1.88	1.79	1.71	1.64	1.58	1.53	1.48	1.43	1.39
2,700	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	5.83	4.21	3.47	2.99	2.67	2.43	2.25	2.11	1.99	1.89	1.80	1.73	1.66	1.60	1.55	1.50
2,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	7.68	4.88	3.84	3.24	2.85	2.59	2.39	2.23	2.10	1.99	1.89	1.81	1.74	1.68	1.62
2,900	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	5.82	4.22	3.49	3.06	2.75	2.53	2.35	2.21	2.09	1.98	1.90	1.82	1.75
3,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	6.86	4.65	3.77	3.27	2.93	2.68	2.48	2.32	2.19	2.08	1.98	1.90
3,100	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	8.38	5.19	4.11	3.51	3.11	2.83	2.61	2.44	2.29	2.17	2.07
3,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	5.84	4.46	3.75	3.30	2.98	2.74	2.55	2.40	2.27
3,300	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	6.61	4.85	4.00	3.49	3.13	2.87	2.67	2.50
3,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	7.55	5.24	4.25	3.68	3.29	3.00	2.78
3,500	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	8.63	5.57	4.45	3.82	3.43	3.12
3,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	9.12	5.83	4.64	3.97	3.54
3,700	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	6.15	4.84	4.13
3,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	6.48	5.06
3,900	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	6.82
4,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
4,100	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
4,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
4,300	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
4,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
4,500	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
4,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
4,700	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
4,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
4,900	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
5,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
5,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
5,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
5,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
5,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
6,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
6,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
6,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
6,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
6,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
7,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
7,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
7,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
7,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
7,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
8,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
8,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
8,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
8,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
8,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
30,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00

Table 6 Red River Control Structure (RRCS) Gate Opening (ft) - Part B

Flow through WRRCS (cfs)	Staging Area Elevation at Red River, $Z_{STAGING-AREA-RR}$ (ft)																																			
	898.8	899.0	899.2	899.4	899.6	899.8	900.0	900.2	900.4	900.6	900.8	901.0	901.2	901.4	901.6	901.8	902.0	902.2	902.4	902.6	902.8	903.0	903.2	903.4	903.6	903.8	904.0	904.2	904.4	904.6	904.8	905.0	905.2	905.4	905.6	905.8
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
900	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,000	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,900	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,000	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.83	0.82	0.82	0.81	0.81	0.80	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.88	0.87	0.86	0.86	0.85	0.85	0.84	0.84	0.84	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.80	0.80	0.80	0.20	0.20
2,200	1.02	1.00	0.20	0.20	0.20	0.20	0.20	0.20	0.93	0.92	0.91	0.91	0.90	0.89	0.89	0.88	0.88	0.88	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.84	0.83
2,300	1.10	1.08	1.06	1.04	1.03	1.01	0.20	0.20	0.98	0.97	0.96	0.95	0.95	0.94	0.93	0.93	0.92	0.92	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.88	0.87	0.87
2,400	1.17	1.15	1.13	1.11	1.10	1.08	1.07	1.05	1.04	1.02	1.01	1.00	0.99	0.98	0.98	0.97	0.97	0.96	0.96	0.95	0.95	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91
2,500	1.26	1.23	1.21	1.18	1.17	1.15	1.13	1.11	1.10	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.95
2,600	1.36	1.32	1.30	1.27	1.24	1.22	1.20	1.18	1.16	1.14	1.13	1.12	1.10	1.09	1.08	1.07	1.06	1.05	1.05	1.04	1.03	1.03	1.02	1.02	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99
2,700	1.46	1.42	1.39	1.36	1.33	1.31	1.28	1.25	1.23	1.21	1.19	1.17	1.16	1.15	1.13	1.12	1.11	1.10	1.09	1.09	1.08	1.07	1.07	1.06	1.06	1.05	1.05	1.04	1.04	1.04	1.04	1.03	1.03	1.03	1.03	1.02
2,800	1.57	1.53	1.49	1.45	1.42	1.39	1.37	1.34	1.31	1.28	1.26	1.24	1.22	1.20	1.19	1.17	1.16	1.15	1.14	1.13	1.13	1.12	1.11	1.11	1.10	1.10	1.09	1.09	1.08	1.08	1.08	1.07	1.07	1.07	1.06	1.06
2,900	1.69	1.64	1.60	1.56	1.52	1.49	1.46	1.42	1.39	1.36	1.33	1.31	1.29	1.27	1.25	1.23	1.22	1.20	1.19	1.18	1.17	1.17	1.16	1.15	1.14	1.14	1.13	1.13	1.12	1.12	1.12	1.11	1.11	1.11	1.10	1.10
3,000	1.83	1.77	1.72	1.67	1.63	1.59	1.56	1.52	1.48	1.45	1.41	1.38	1.36	1.33	1.31	1.30	1.28	1.26	1.25	1.24	1.23	1.21	1.20	1.20	1.19	1.18	1.18	1.17	1.16	1.16	1.15	1.15	1.15	1.14	1.14	1.14
3,100	1.98	1.91	1.85	1.80	1.75	1.71	1.67	1.62	1.58	1.54	1.50	1.47	1.43	1.40	1.38	1.36	1.34	1.32	1.31	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.21	1.20	1.19	1.19	1.18	1.18	1.18	1.17
3,200	2.16	2.07	2.00	1.94	1.88	1.83	1.78	1.73	1.69	1.64	1.59	1.56	1.52	1.49	1.46	1.43	1.40	1.38	1.37	1.35	1.34	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.24	1.23	1.23	1.22	1.22	1.21
3,300	2.37	2.25	2.17	2.09	2.02	1.97	1.91	1.86	1.80	1.75	1.70	1.65	1.61	1.57	1.54	1.51	1.48	1.45	1.43	1.41	1.39	1.38	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.28	1.27	1.26	1.26	1.25
3,400	2.60	2.46	2.35	2.26	2.18	2.11	2.05	1.98	1.92	1.86	1.80	1.75	1.70	1.66	1.62	1.59	1.55	1.53	1.50	1.48	1.46	1.44	1.42	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.31	1.30	1.29
3,500	2.88	2.70	2.56	2.45	2.36	2.28	2.20	2.13	2.06	1.98	1.92	1.86	1.80	1.76	1.71	1.67	1.64	1.60	1.57	1.55	1.52	1.50	1.48	1.46	1.45	1.43	1.42	1.40	1.39	1.38	1.37	1.36	1.36	1.35	1.34	1.34
3,600	3.22	2.98	2.80	2.67	2.55	2.46	2.37	2.29	2.20	2.12	2.04	1.97	1.91	1.86	1.81	1.76	1.72	1.69	1.65	1.62	1.59	1.57	1.54	1.52	1.51	1.49	1.47	1.46	1.45	1.43	1.42	1.41	1.40	1.39	1.38	1.38
3,700	3.67	3.34	3.10	2.93	2.79	2.67	2.57	2.48	2.37	2.27	2.18	2.10	2.03	1.97	1.91	1.86	1.81	1.77	1.74	1.70	1.67	1.64	1.61	1.59	1.57	1.55	1.53	1.51	1.50	1.49	1.47	1.46	1.45	1.44	1.43	1.42
3,800	4.29	3.80	3.47	3.24	3.06	2.92	2.79	2.68	2.56	2.43	2.33	2.24	2.16	2.09	2.02	1.96	1.91	1.87	1.82	1.79	1.75	1.72	1.69	1.66	1.63	1.61	1.59	1.57	1.55	1.54	1.52	1.51	1.50	1.49	1.48	1.47
3,900	5.26	4.44	3.96	3.64	3.40	3.21	3.06	2.92	2.77	2.62	2.50	2.39	2.29	2.21	2.14	2.08	2.02	1.97	1.92	1.88	1.84	1.80	1.76	1.73	1.70	1.68	1.65	1.63	1.61	1.59	1.58	1.56	1.55	1.54	1.52	1.51
4,000	7.12	5.44	4.60	4.15	3.82	3.56	3.37	3.20	3.03	2.84	2.69	2.56	2.44	2.35	2.27	2.19	2.13	2.07	2.02	1.97	1.93	1.89	1.85	1.81	1.78	1.75	1.72	1.70	1.67	1.65	1.63	1.61	1.60	1.58	1.57	1.56
4,100	52.00	7.32	5.63	4.86	4.37	4.02	3.76	3.55	3.32	3.09	2.90	2.75	2.61	2.50	2.40	2.32	2.25	2.18	2.12	2.07	2.02	1.98	1.94	1.90	1.86	1.82	1.79	1.76	1.74	1.71	1.69	1.67	1.65	1.64	1.62	1.61
4,200	52.00	52.00	7.58	5.94	5.17	4.63	4.25	3.97	3.69	3.39	3.15	2.96	2.80	2.67	2.56	2.46	2.38	2.30	2.24	2.18	2.12	2.07	2.03	1.98	1.94	1.91	1.87	1.83	1.80	1.77	1.75	1.73	1.71	1.69	1.68	1.66
4,300	52.00	52.00	52.00	8.13	6.44	5.49	4.92	4.52	4.21	3.75	3.45	3.20	3.01	2.85	2.72	2.61	2.52	2.43	2.36	2.29	2.23	2.17	2.12	2.08	2.03	1.99	1.95	1.91	1.88	1.84	1.81	1.79	1.77	1.75	1.73	1.71
4,400	52.00	52.00	52.00	52.00	9.03	6.97	5.92	5.27	4.73	4.22	3.80	3.50	3.25	3.06	2.91	2.78	2.67	2.57	2.49	2.41	2.34	2.28	2.22	2.17	2.12	2.08	2.03	1.99	1.95	1.92	1.88	1.85	1.83	1.80	1.78	1.77
4,500	52.00	52.00	52.00	52.00	52.00	10.39	7.64	6.46	5.68	4.86	4.25	3.85	3.54	3.30	3.11	2.96	2.83	2.72	2.62	2.54	2.46	2.39	2.33	2.27	2.22	2.17	2.12	2.08	2.03	1.99	1.96	1.92	1.89	1.87	1.84	1.82
4,600	52.00	52.00	52.00	52.00	52.00	52.00	12.60	8.73	7.19	5.73	4.83	4.28	3.88	3.57	3.35	3.16	3.01	2.88	2.77	2.68	2.59	2.52	2.44	2.38	2.32	2.26	2.21	2.16	2.12	2.08	2.03	1.99	1.96	1.93	1.91	1.88
4,700	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	10.10	7.32	5.67	4.85	4.29	3.90	3.62	3.39	3.21	3.07	2.94	2.83	2.73	2.64	2.56	2.49	2.43	2.36	2.31	2.26	2.20	2.16	2.12	2.07	2.03	2.00	1.97	1.94
4,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	12.27	6.99	5.60	4.82	4.29	3.93	3.66	3.44	3.27	3.12	2.99	2.88	2.78	2.69	2.61	2.54	2.47	2.41	2.35	2.30	2.25	2.20	2.15	2.11	2.08	2.04	2.00
4,900	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	9.82	6.82	5.55	4.79	4.32	3.97	3.71	3.49	3.32	3.17	3.05	2.93	2.83	2.74	2.66	2.58	2.52	2.45	2.39	2.34	2.29	2.24	2.19	2.15	2.11	2.08
5,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	9.08	6.60	5.45	4.79	4.34	4.00	3.75	3.54	3.37	3.22	3.09	2.98	2.88	2.79	2.71	2.63	2.56	2.49	2.43	2.38	2.32	2.28	2.23	2.19	2.15
5,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	13.51	7.92	6.26	5.37	4.80	4.40	4.09	3.85	3.64	3.47	3.32	3.19	3.07	2.97	2.87	2.79	2.71	2.64	2.57	2.51	2.45	2.40	2.35	2.31
5,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	9.97	7.29	6.06	5.34	4.84	4.47	4.17	3.93	3.72	3.55	3.40	3.27	3.15	3.05	2.95	2.87	2.78	2.71	2.65	2.58	2.53	2.48
5,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	13.95	8.72	6.97	5.99	5.34	4.88	4.51	4.22	3.99	3.79	3.62	3.47	3.34	3.22	3.12	3.02	2.93	2.85	2.78	2.72	2.66
5,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	11.07	8.13	6.74	5.90	5.31	4.87	4.54	4.27	4.04	3.85	3.68	3.53	3.40	3.28	3.18	3.09	3.00	2.93	2.85
6,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	15.97	9.69	7.65	6.52	5.78	5.26	4.88	4.56	4.30	4.08	3.89	3.73	3.58	3.45	3.34	3.24	3.15	3.07
6,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	11.99	8.73	7.20	6.30	5.69	5.23	4.87	4.57	4.32	4.11	3.92	3.76	3.63	3.51	3.40	3.30
6,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	15.90	10.05	8.00	6.89	6.14	5.60	5.17	4.84	4.56	4.32	4.12	3.95	3.81	3.68	3.56
6,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	11.55	8.84	7.45	6.58	5.93	5.46	5.07	4.76	4.52	4.31	4.13	3.97	3.83
6,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	13.58	9.81	8.15	7.05	6.32	5.78	5.35	5.02	4.76	4.53	4.34	4.16
7,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.12	11.39	8.96	7.60	6.74	6.11	5.65	5.30	5.00	4.75	4.53
7,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	13.06	9.75	8.16	7.15	6.47	5.97	5.57	5.24	4.96
7,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	15.09	10.67	8.73	7.60	6.85	6.28	5.83	5.48
7,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	17.79	11.66	9.36	8.09	7.23	6.59	6.11
7,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	21.41	12.77	10.07	8.58	7.59	6.91
8,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	14.23	10.82	9.06	8.00
8,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	15.90	11.57	9.62
8,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	17.45	12.40
8,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	19.46
8,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
9,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
10,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
11,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
12,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
13,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
14,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
15,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
16,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
17,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
18,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
30,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00

Table 6 Red River Control Structure (RRCS) Gate Opening (ft) - Part C

Flow through WRRCS (cfs)	Staging Area Elevation at Red River, $Z_{STAGING-AREA-RR}$ (ft)																																		
	906.0	906.2	906.4	906.6	906.8	907.0	907.2	907.4	907.6	907.8	908.0	908.2	908.4	908.6	908.8	909.0	909.2	909.4	909.6	909.8	910.0	910.2	910.4	910.6	910.8	911.0	911.2	911.4	911.6	911.8	912.0	912.2	912.4	912.6	912.8	913.0
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
900	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,000	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,900	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,000	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,200	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.80	0.80	0.80	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,300	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.82
2,400	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.85	0.85	0.85
2,500	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.89
2,600	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.92
2,700	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96
2,800	1.06	1.06	1.06	1.05	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99
2,900	1.10	1.09	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.08	1.07	1.07	1.07	1.07	1.07	1.06	1.06	1.06	1.06	1.06	1.05	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.03	1.03	1.03	1.03
3,000	1.13	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.09	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.08	1.07	1.07	1.07	1.07	1.07	1.07	1.06
3,100	1.17	1.17	1.17	1.16	1.16	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10
3,200	1.21	1.21	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.18	1.18	1.18	1.18	1.17	1.17	1.17	1.17	1.17	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.13
3,300	1.25	1.25	1.24	1.24	1.24	1.24	1.23	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.19	1.18	1.18	1.18	1.18	1.18	1.17	1.17	1.17
3,400	1.29	1.29	1.28	1.28	1.28	1.27	1.27	1.27	1.27	1.26	1.26	1.26	1.26	1.25	1.25	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.23	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21
3,500	1.33	1.32	1.32	1.32	1.31	1.31	1.31	1.30	1.30	1.30	1.30	1.29	1.29	1.29	1.29	1.29	1.28	1.28	1.28	1.28	1.27	1.27	1.27	1.27	1.27	1.26	1.26	1.26	1.26	1.25	1.25	1.25	1.25	1.25	1.24	1.24
3,600	1.37	1.36	1.36	1.35	1.35	1.35	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.32	1.32	1.32	1.32	1.32	1.32	1.31	1.31	1.31	1.31	1.30	1.30	1.30	1.30	1.29	1.29	1.29	1.29	1.29	1.28	1.28	1.28	1.28
3,700	1.41	1.40	1.40	1.39	1.39	1.38	1.38	1.38	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.35	1.35	1.35	1.35	1.34	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.32	1.32	1.32	1.32	1.31	1.31
3,800	1.46	1.45	1.44	1.44	1.43	1.42	1.42	1.41	1.41	1.41	1.40	1.40	1.40	1.40	1.40	1.39	1.39	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.37	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.35	1.35	1.35	1.35
3,900	1.50	1.49	1.49	1.48	1.47	1.47	1.46	1.45	1.45	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.42	1.41	1.41	1.41	1.41	1.40	1.40	1.40	1.40	1.40	1.39	1.39	1.39	1.39	1.38
4,000	1.55	1.54	1.53	1.52	1.51	1.51	1.50	1.49	1.49	1.48	1.48	1.48	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.46	1.45	1.45	1.45	1.45	1.45	1.44	1.44	1.44	1.44	1.43	1.43	1.43	1.42	1.42	1.42	1.42
4,100	1.60	1.58	1.57	1.56	1.56	1.55	1.54	1.53	1.53	1.52	1.52	1.51	1.51	1.51	1.50	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.48	1.48	1.48	1.48	1.48	1.48	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.45
4,200	1.65	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.57	1.56	1.56	1.55	1.55	1.54	1.54	1.54	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.52	1.52	1.51	1.51	1.51	1.51	1.51	1.50	1.50	1.50	1.50	1.49	1.49
4,300	1.70	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.59	1.58	1.58	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.56	1.55	1.55	1.55	1.55	1.55	1.55	1.54	1.54	1.54	1.54	1.53	1.53	1.53	1.53
4,400	1.75	1.73	1.72	1.71	1.69	1.68	1.67	1.66	1.65	1.64	1.64	1.63	1.62	1.62	1.61	1.61	1.60	1.60	1.60	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.58	1.58	1.57	1.57	1.57	1.57	1.57	1.56	1.56
4,500	1.80	1.78	1.77	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.66	1.65	1.65	1.64	1.64	1.63	1.63	1.63	1.63	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.61	1.61	1.61	1.60	1.60	1.60	1.60
4,600	1.86	1.84	1.82	1.80	1.79	1.78	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.70	1.69	1.68	1.68	1.67	1.67	1.67	1.66	1.66	1.66	1.66	1.65	1.65	1.65	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.63	1.63
4,700	1.92	1.90	1.88	1.86	1.84	1.82	1.81	1.80	1.78	1.77	1.76	1.75	1.74	1.74	1.73	1.72	1.72	1.71	1.71	1.70	1.70	1.70	1.69	1.69	1.69	1.69	1.69	1.69	1.68	1.68	1.68	1.67	1.67	1.67	1.67	1.67
4,800	1.97	1.95	1.93	1.91	1.89	1.88	1.86	1.85	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.76	1.75	1.74	1.74	1.74	1.73	1.73	1.73	1.72	1.72	1.72	1.72	1.71	1.71	1.71	1.71	1.71	1.71	1.70	1.70
4,900	2.04	2.01	1.99	1.97	1.95	1.93	1.91	1.90	1.88	1.87	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.79	1.78	1.78	1.77	1.77	1.76	1.76	1.76	1.75	1.75	1.75	1.75	1.75	1.74	1.74	1.74	1.74	1.74	1.74
5,000	2.11	2.08	2.05	2.02	2.00	1.98	1.96	1.95	1.93	1.91	1.90	1.89	1.88	1.86	1.85	1.84	1.84	1.83	1.82	1.81	1.81	1.80	1.80	1.79	1.79	1.79	1.79	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78
5,200	2.26	2.22	2.19	2.15	2.12	2.10	2.07	2.05	2.03	2.01	2.00	1.98	1.97	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.89	1.88	1.87	1.87	1.86	1.86	1.86	1.85	1.85	1.85	1.84	1.84	1.84	1.84	1.84	1.84
5,400	2.43	2.38	2.34	2.30	2.26	2.22	2.19	2.17	2.14	2.12	2.10	2.08	2.06	2.05	2.03	2.02	2.01	1.99	1.98	1.97	1.97	1.96	1.95	1.94	1.94	1.93	1.93	1.92	1.92	1.92	1.91	1.91	1.91	1.91	1.91	1.90
5,600	2.60	2.55	2.50	2.45	2.41	2.37	2.33	2.29	2.26	2.23	2.21	2.18	2.16	2.15	2.13	2.11	2.10	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	2.01	2.00	1.99	1.99	1.98	1.98	1.98	1.97	1.97	1.97	1.97
5,800	2.78	2.73	2.67	2.61	2.57	2.52	2.48	2.44	2.39	2.36	2.33	2.30	2.27	2.25	2.23	2.21	2.19	2.18	2.16	2.15	2.14	2.12	2.11	2.10	2.09	2.08	2.08	2.07	2.06	2.06	2.05	2.05	2.04	2.04	2.04	2.03
6,000	2.99	2.92	2.85	2.79	2.74	2.68	2.64	2.59	2.54	2.50	2.46	2.42	2.38	2.36	2.34	2.31	2.29	2.27	2.26	2.24	2.22	2.21	2.20	2.18	2.17	2.16	2.15	2.15	2.14	2.13	2.13	2.12	2.11	2.11	2.11	2.10
6,200	3.21	3.13	3.05	2.98	2.92	2.86	2.80	2.75	2.70	2.65	2.60	2.56	2.52	2.48	2.45	2.42	2.40	2.37	2.35	2.34	2.32	2.30	2.29	2.27	2.26	2.25	2.24	2.23	2.22	2.21	2.20	2.19	2.19	2.18	2.18	2.17
6,400	3.45	3.35	3.27	3.18	3.11	3.04	2.98	2.92	2.86	2.80	2.75	2.70	2.66	2.61	2.57	2.54	2.51	2.48	2.46	2.43	2.41	2.39	2.38	2.36	2.35	2.33	2.32	2.31	2.30	2.29	2.28	2.27	2.26	2.26	2.25	2.24
6,600	3.71	3.59	3.50	3.40	3.32	3.24	3.17	3.10	3.03	2.97	2.91	2.86	2.81	2.76	2.71	2.67	2.63	2.59	2.56	2.54	2.52	2.50	2.48	2.46	2.44	2.42	2.41	2.39	2.38	2.37	2.36	2.35	2.34	2.33	2.32	2.32
6,800	4.01	3.88	3.76	3.65	3.55	3.46	3.38	3.30	3.22	3.15	3.08	3.02	2.97	2.91	2.86	2.81	2.77	2.73	2.69	2.65	2.62	2.60	2.58	2.56	2.54	2.52	2.50	2.48	2.47	2.45	2.44	2.43	2.42	2.41	2.40	2.39
7,000	4.35	4.19	4.04	3.91	3.80	3.69	3.60	3.51	3.42	3.34	3.27	3.20	3.13	3.07	3.02	2.96	2.92	2.87	2.82	2.78	2.74	2.71	2.68	2.66	2.63	2.61	2.59	2.57	2.56	2.54	2.53	2.51	2.50	2.49	2.48	2.47
7,200	4.74	4.54	4.36	4.21	4.07	3.95	3.84	3.73	3.63	3.54	3.46	3.38	3.31	3.24	3.18	3.12	3.07	3.01	2.96	2.92	2.87	2.83	2.79	2.76	2.74	2.71	2.69	2.67	2.65	2.63	2.61	2.60	2.59	2.57	2.56	2.55
7,400	5.19	4.94	4.73	4.54	4.38	4.24	4.11	3.98	3.86	3.76	3.67	3.58	3.50	3.42	3.35	3.29	3.23	3.17	3.11	3.06	3.01	2.97	2.93	2.89	2.85	2.82	2.79	2.77	2.75	2.72	2.71	2.69	2.67	2.66	2.64	2.63
7,600	5.73	5.41	5.14	4.92	4.72	4.55	4.40	4.25	4.12	4.00	3.89	3.79	3.70	3.62	3.54	3.47	3.40	3.33	3.27	3.21	3.16	3.11	3.06	3.02	2.98	2.94	2.90	2.87	2.85	2.82	2.80	2.78	2.76	2.75	2.73	2.72
7,800	6.39	5.98	5.63	5.35	5.11	4.91	4.73	4.55	4.39	4.26	4.13	4.02	3.92	3.82	3.73	3.65	3.58	3.50	3.44	3.37	3.31	3.26	3.21	3.16	3.11	3.06	3.02	2.98	2.95	2.92	2.90	2.88	2.86	2.84	2.82	2.80
8,000	7.25	6.68	6.23	5.87	5.57	5.32	5.10	4.88	4.70	4.54	4.40	4.27	4.15	4.04	3.94	3.85	3.77	3.69	3.61	3.54	3.48	3.41	3.36	3.31	3.25	3.20	3.15	3.11	3.06	3.03	3.00	2.98	2.96	2.94	2.92	2.89
8,200	8.43	7.59	6.97	6.49	6.10	5.79	5.52	5.25	5.04	4.85	4.69	4.54	4.40	4.28	4.17	4.06	3.97	3.88	3.79	3.72	3.64	3.58	3.52	3.47	3.40	3.34	3.29	3.24	3.19	3.15	3.12	3.09	3.06	3.03	3.01	2.99
8,400	10.18	8.82	7.92	7.25	6.74	6.34	5.99	5.68	5.42	5.20	5.00	4.83	4.67	4.53	4.40	4.29	4.18	4.08	3.98	3.90	3.82	3.75	3.68	3.62	3.55	3.49	3.43	3.38	3.33	3.28	3.23	3.20	3.16	3.14	3.11	3.09
8,600	13.22	10.65	9.20	8.23	7.53	7.00	6.55	6.15	5.85	5.58	5.35	5.15	4.97	4.80	4.66	4.52	4.40	4.29	4.19	4.09	4.00	3.93	3.85	3.78	3.71	3.65	3.58	3.52	3.47	3.41	3.37	3.33	3.29	3.25	3.21	3.18
8,800	21.73	13.85	11.20	9.57	8.58	7.86	7.23	6.73	6.35	6.02	5.75	5.51	5.30	5.11	4.94	4.79	4.65	4.53	4.41	4.30	4.21	4.12	4.04	3.97	3.88	3.81	3.74	3.67	3.61	3.56	3.51	3.46	3.42	3.38	3.33	3.30
9,000	52.00	52.00	15.26	11.90	10.12	9.02	8.12	7.46	6.95	6.55	6.21	5.92	5.67	5.45	5.25	5.08	4.92	4.78	4.65	4.53	4.42	4.32	4.23	4.15	4.06	3.98	3.90	3.83	3.76	3.70	3.65	3.60	3.55	3.51	3.46	3.41
9,200	52.00	52.00	52.00	16.10	12.44	10.61	9.23	8.33	7.66	7.14	6.73	6.38	6.08	5.81	5.59	5.38	5.21	5.04	4.89	4.76	4.64	4.53	4.43	4.35	4.24	4.15	4.07	3.99	3.92	3.85	3.79	3.74	3.69	3.64	3.59	3.54
9,400	52.00	52.00	52.00	52.00	17.13	13.20	10.81	9.46	8.54	7.87	7.34	6.91	6.54	6.23	5.96	5.72	5.52	5.33	5.16	5.01	4.88	4.76	4.65	4.55	4.44	4.34	4.25	4.16	4.08	4.01	3.95	3.89	3.83	3.78	3.73	3.67
9,600	52.00	52.00	52.00	52.00	52.00	18.73	13.34	11.08	9.71	8.77	8.08	7.53	7.08	6.70	6.38	6.10	5.86	5.65	5.45	5.28	5.13	4.99	4.88	4.77	4.64	4.53	4.43	4.34	4.25	4.17	4.10	4.04	3.98	3.92	3.87	3.81
9,800	52.00	52.00	52.00	52.00	52.00	52.00	18.14	13.49	11.28	9.91	8.97	8.26	7.69	7.23	6.84	6.51	6.23	5.98	5.76	5.57	5.39	5.24	5.11	4.98	4.85	4.73	4.62	4.52	4.42	4.34	4.26	4.19	4.13	4.07	4.01	3.95
10,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	17.95	13.60	11.45	10.10	9.14	8.41	7.83	7.36	6.97	6.64	6.35	6.09	5.87	5.68	5.51	5.37	5.22	5.07	4.94	4.82	4.71	4.60	4.51	4.43	4.36	4.29	4.22	4.16	4.09
10,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.09	13.85	11.68	10.31	9.31	8.56	7.98	7.50	7.11	6.77	6.47	6.21	5.99	5.80	5.64	5.47	5.31	5.16	5.03	4.91	4.80	4.70	4.60	4.52	4.45	4.38	4.31	4.23
10,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.24	14.07	11.89	10.48	9.46	8.71	8.11	7.63	7.23	6.88	6.58	6.33	6.12	5.94	5.75	5.56	5.40	5.25	5.12	4.99	4.89	4.78	4.70	4.62	4.55	4.46	4.38
10,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.35	14.23	12.03	10.60	9.59	8.84	8.24	7.75	7.34	7.00	6.70	6.46	6.25	6.03	5.83	5.65	5.49	5.34	5.20	5.08	4.97	4.88	4.80	4.71	4.62	4.52
10,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.47	14.37	12.14	10.73	9.72	8.96	8.37	7.86	7.46	7.11	6.83	6.59	6.34	6.11	5.91	5.73	5.57	5.42	5.29	5.17	5.07	4.98	4.88	4.77	4.67
11,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.41	14.37	12.22	10.83	9.83	9.07	8.46	7.97	7.57	7.24	6.96	6.68	6.41	6.19	5.99	5.81	5.65	5.51	5.38	5.26	5.15	5.04	4.93	4.82
11,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.06	14.31	12.25	10.89	9.91	9.15	8.55	8.07	7.68	7.37	7.04	6.74	6.49	6.27	6.07	5.89	5.73	5.59	5.46	5.33	5.21	5.09	4.97
11,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	17.71	14.24	12.26	10.94	9.96	9.22	8.64	8.19	7.82	7.43	7.09	6.81	6.56	6.34	6.15	5.97	5.80	5.65	5.51	5.38	5.25	5.13
11,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	17.36	14.14	12.26	10.96	10.01	9.30	8.75	8.33	7.86	7.47	7.16	6.88	6.63	6.40	6.20	6.02	5.85	5.70	5.56	5.42	5.29
11,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	23.31	16.94	14.00	12.19	10.95	10.06	9.39	8.87	8.32	7.88	7.51	7.19	6.91	6.65	6.43	6.23	6.05	5.88	5.73	5.59	5.46
12,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	21.83	16.48	13.77	12.10	10.95	10.12	9.47	8.81	8.29	7.87	7.50	7.19	6.91	6.67	6.45	6.26	6.08	5.91	5.77	5.63
12,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	20.52	15.97	13.54	12.02	10.94	10.08	9.31	8.71	8.23	7.82	7.47	7.17	6.91	6.68	6.46	6.27	6.10	5.95	5.80
12,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	19.34	15.46	13.30	11.82	10.70	9.82	9.14	8.60	8.15	7.77	7.45	7.16	6.91	6.67	6.47	6.28	6.13	5.98
12,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.00	14.74	12.76	11.39	10.37	9.60	8.99	8.50	8.09	7.73	7.41	7.14	6.89	6.67	6.48	6.31	6.16
12,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	21.39	16.41	13.82	12.13	10.95	10.09	9.42	8.87	8.40	8.00	7.67	7.38	7.12	6.89	6.68	6.51	6.35
13,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.52	15.04	13.06	11.63	10.62	9.84	9.23	8.72	8.30	7.94	7.63	7.36	7.11	6.89	6.71	6.54
13,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	21.31	16.56	14.00	12.33	11.16	10.30	9.61	9.07	8.61	8.22	7.90	7.60	7.34	7.11	6.91	6.74
13,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	18.53	15.07	13.09	11.74	10.78	10.03	9.43	8.94	8.53	8.18	7.87	7.59	7.34	7.13	6.95
13,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	20.82	16.26	13.93	12.40	11.32	10.49	9.83	9.30	8.85	8.47	8.14	7.84	7.58	7.35	7.16
13,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	23.83	17.84	14.94	13.14	11.91	10.98	10.26	9.67	9.19	8.78	8.42	8.10	7.82	7.59	7.39
14,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	19.74	16.09	13.97	12.55	11.52	10.72	10.08	9.54	9.10	8.72	8.37	8.08	7.82	7.61
14,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	22.43	17.72	14.96	13.30	12.11	11.23	10.51	9.92	9.45	9.04	8.67	8.35	8.08	7.86
14,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	26.81	19.44	16.14	14.16	12.80	11.79	10.98	10.35	9.83	9.38	8.98	8.64	8.36	8.11
14,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	22.39	17.61	15.18	13.57	12.41	11.52	10.81	10.24	9.74	9.32	8.96	8.65	8.37
14,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	25.79	19.41	16.38	14.45	13.10	12.09	11.31	10.68	10.14	9.69	9.29	8.94	8.64
15,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	21.81	17.81	15.48	13.89	12.74	11.85	11.15	10.58	10.08	9.64	9.25	8.92
15,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	25.27	19.66	16.69	14.81	13.46	12.46	11.70	11.05	10.49	10.01	9.58	9.22
15,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	22.12	18.20	15.88	14.29	13.17	12.30	11.56	10.93	10.38	9.91	9.52
15,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	25.55	20.09	17.17	15.30	13.95	12.94	12.11	11.39	10.78	10.27	9.85
15,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	22.62	18.81	16.48	14.86	13.66	12.68	11.87	11.21	10.65	10.20
16,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	26.48	20.87	17.88	15.89	14.42	13.29	12.39	11.66	11.06	10.56
16,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	23.76	19.61	17.05	15.29	13.98	12.98	12.17	11.50	10.95
16,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	28.12	21.72	18.37	16.27	14.78	13.63	12.72	11.97	11.38
16,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	24.40	19.99	17.45	15.67	14.36	13.33	12.50	11.83
16,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	28.45	22.13	18.87	16.72	15.18	14.00	13.06	12.32
17,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	24.96	20.60	17.94	16.12	14.75	13.69	12.85
17,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	22.88	19.40	17.22	15.59	14.37	13.42
17,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	25.87	21.19	18.49	16.54	15.13	14.05
17,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	23.53	20.00	17.65	15.97	14.74
17,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	26.61	21.85	18.93	16.93	15.49
18,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	24.25	20.45	18.03	16.34
18,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.46	22.32	19.31	17.29
18,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	24.67	20.82	18.37
18,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.77	22.62	19.60
18,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	24.84	21.03
19,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.74	22.72
19,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	24.82
19,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.82
19,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
19,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
20,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
21,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
22,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
23,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
24,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
25,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
26,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
27,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
28,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
29,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
30,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00

Table 6 Red River Control Structure (RRCS) Gate Opening (ft) - Part D

Staging Area Elevation at Red River, $Z_{STAGING-AREA-RR}$ (ft)

Flow through WRRCS (cfs)	913.2	913.4	913.6	913.8	914.0	914.2	914.4	914.6	914.8	915.0	915.2	915.4	915.6	915.8	916.0	916.2	916.4
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
900	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,000	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
1,900	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,000	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2,300	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.80	0.80	0.80	0.80	0.20	0.20	0.20	0.20	0.20	0.20
2,400	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.83	0.83	0.83	0.83	0.83	0.83
2,500	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.86	0.86	0.86
2,600	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90	0.90
2,700	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
2,800	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.97	0.97
2,900	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00
3,000	1.06	1.06	1.06	1.06	1.05	1.05	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.03
3,100	1.10	1.10	1.09	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.08	1.08	1.07	1.07	1.07	1.07
3,200	1.13	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	1.10
3,300	1.17	1.17	1.16	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14
3,400	1.20	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.19	1.18	1.18	1.18	1.18	1.18	1.17	1.17
3,500	1.24	1.24	1.23	1.23	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21
3,600	1.27	1.27	1.27	1.27	1.27	1.26	1.26	1.26	1.26	1.26	1.25	1.25	1.25	1.25	1.25	1.24	1.24
3,700	1.31	1.31	1.31	1.30	1.30	1.30	1.30	1.29	1.29	1.29	1.29	1.29	1.28	1.28	1.28	1.28	1.28
3,800	1.35	1.34	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.33	1.32	1.32	1.32	1.32	1.31	1.31	1.31
3,900	1.38	1.38	1.38	1.37	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.36	1.35	1.35	1.35	1.35	1.35
4,000	1.42	1.41	1.41	1.41	1.41	1.40	1.40	1.40	1.40	1.40	1.39	1.39	1.39	1.39	1.38	1.38	1.38
4,100	1.45	1.45	1.45	1.44	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.42	1.41
4,200	1.49	1.48	1.48	1.48	1.48	1.47	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.46	1.45	1.45	1.45
4,300	1.52	1.52	1.52	1.51	1.51	1.51	1.51	1.50	1.50	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.48
4,400	1.56	1.56	1.55	1.55	1.55	1.55	1.54	1.54	1.54	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.52
4,500	1.59	1.59	1.59	1.59	1.58	1.58	1.58	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.56	1.55	1.55
4,600	1.63	1.63	1.62	1.62	1.62	1.62	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.59	1.59	1.59	1.59
4,700	1.66	1.66	1.66	1.66	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.63	1.63	1.63	1.63	1.62	1.62
4,800	1.70	1.70	1.69	1.69	1.69	1.69	1.68	1.68	1.68	1.67	1.67	1.67	1.67	1.66	1.66	1.66	1.66
4,900	1.74	1.73	1.73	1.73	1.72	1.72	1.72	1.71	1.71	1.71	1.71	1.70	1.70	1.70	1.70	1.69	1.69
5,000	1.77	1.77	1.76	1.76	1.76	1.76	1.75	1.75	1.75	1.74	1.74	1.74	1.74	1.73	1.73	1.73	1.72
5,200	1.84	1.84	1.83	1.83	1.83	1.83	1.82	1.82	1.82	1.81	1.81	1.81	1.81	1.80	1.80	1.80	1.79
5,400	1.90	1.90	1.90	1.90	1.89	1.89	1.89	1.89	1.89	1.88	1.88	1.88	1.87	1.87	1.87	1.87	1.86
5,600	1.97	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.95	1.95	1.95	1.94	1.94	1.94	1.93	1.93
5,800	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.02	2.02	2.02	2.02	2.01	2.01	2.01	2.00	2.00
6,000	2.10	2.10	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.08	2.08	2.08	2.08	2.08	2.08	2.07	2.07
6,200	2.17	2.16	2.16	2.16	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.14	2.14
6,400	2.24	2.23	2.23	2.22	2.22	2.22	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21
6,600	2.31	2.30	2.30	2.29	2.29	2.28	2.28	2.28	2.28	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27
6,800	2.38	2.37	2.37	2.36	2.36	2.35	2.35	2.34	2.34	2.34	2.34	2.33	2.33	2.33	2.33	2.33	2.33
7,000	2.46	2.45	2.44	2.43	2.43	2.42	2.41	2.41	2.41	2.40	2.40	2.40	2.39	2.39	2.39	2.39	2.39
7,200	2.54	2.53	2.52	2.51	2.50	2.49	2.49	2.48	2.47	2.47	2.47	2.46	2.46	2.46	2.46	2.45	2.45
7,400	2.62	2.60	2.59	2.58	2.57	2.56	2.56	2.55	2.54	2.54	2.53	2.53	2.52	2.52	2.52	2.52	2.52
7,600	2.70	2.69	2.67	2.66	2.65	2.64	2.63	2.62	2.61	2.61	2.60	2.59	2.59	2.59	2.58	2.58	2.58
7,800	2.79	2.77	2.75	2.74	2.73	2.72	2.71	2.70	2.69	2.68	2.67	2.66	2.66	2.65	2.65	2.64	2.64
8,000	2.87	2.86	2.84	2.82	2.81	2.79	2.78	2.77	2.76	2.75	2.74	2.73	2.73	2.72	2.72	2.71	2.71
8,200	2.97	2.94	2.93	2.91	2.89	2.88	2.86	2.85	2.84	2.82	2.81	2.80	2.80	2.79	2.78	2.78	2.77
8,400	3.06	3.04	3.01	2.99	2.98	2.96	2.94	2.93	2.91	2.90	2.89	2.88	2.87	2.86	2.85	2.85	2.84
8,600	3.16	3.13	3.11	3.09	3.06	3.05	3.03	3.01	2.99	2.98	2.97	2.95	2.94	2.93	2.92	2.92	2.91
8,800	3.26	3.23	3.20	3.18	3.15	3.13	3.11	3.09	3.07	3.06	3.04	3.03	3.02	3.01	3.00	2.99	2.98
9,000	3.37	3.33	3.30	3.27	3.25	3.22	3.20	3.18	3.16	3.14	3.12	3.11	3.09	3.08	3.07	3.06	3.05
9,200	3.49	3.44	3.40	3.37	3.34	3.31	3.29	3.26	3.24	3.22	3.20	3.19	3.17	3.16	3.15	3.13	3.12
9,400	3.62	3.57	3.52	3.47	3.44	3.40	3.38	3.35	3.33	3.31	3.29	3.27	3.25	3.24	3.22	3.21	3.20
9,600	3.75	3.69	3.63	3.58	3.53	3.50	3.47	3.44	3.42	3.39	3.37	3.35	3.33	3.32	3.30	3.29	3.27
9,800	3.88	3.82	3.75	3.69	3.64	3.59	3.57	3.54	3.51	3.48	3.46	3.44	3.42	3.40	3.38	3.36	3.35
10,000	4.02	3.94	3.88	3.81	3.76	3.71	3.67	3.63	3.60	3.57	3.55	3.52	3.50	3.48	3.46	3.44	3.43
10,200	4.15	4.07	4.00	3.94	3.88	3.83	3.78	3.73	3.69	3.66	3.64	3.61	3.59	3.56	3.54	3.52	3.51
10,400	4.29	4.21	4.13	4.06	4.00	3.95	3.90	3.84	3.79	3.76	3.73	3.70	3.68	3.65	3.63	3.61	3.59
10,600	4.43	4.34	4.26	4.19	4.13	4.07	4.01	3.96	3.90	3.86	3.82	3.79	3.77	3.74	3.71	3.69	3.67
10,800	4.57	4.48	4.40	4.32	4.26	4.19	4.14	4.08	4.02	3.97	3.93	3.89	3.86	3.83	3.80	3.78	3.75
11,000	4.72	4.62	4.53	4.46	4.39	4.32	4.26	4.20	4.14	4.08	4.03	3.98	3.95	3.92	3.89	3.86	3.84
11,200	4.86	4.76	4.68	4.60	4.52	4.45	4.39	4.32	4.26	4.20	4.15	4.10	4.05	4.01	3.98	3.95	3.93
11,400	5.02	4.91	4.82	4.74	4.66	4.59	4.52	4.45	4.38	4.32	4.27	4.21	4.16	4.12	4.08	4.04	4.01
11,600	5.17	5.06	4.97	4.88	4.80	4.72	4.65	4.58	4.51	4.45	4.39	4.33	4.27	4.22	4.17	4.13	4.10
11,800	5.33	5.22	5.12	5.03	4.94	4.86	4.79	4.71	4.64	4.57	4.51	4.45	4.39	4.33	4.28	4.23	4.19
12,000	5.50	5.38	5.27	5.17	5.08	5.00	4.92	4.84	4.77	4.70	4.63	4.57	4.50	4.45	4.39	4.34	4.29
12,200	5.67	5.54	5.43	5.33	5.23	5.14	5.06	4.98	4.90	4.82	4.75	4.69	4.62	4.56	4.50	4.45	4.39
12,400	5.84	5.70	5.59	5.48	5.38	5.29	5.20	5.12	5.03	4.95	4.88	4.81	4.74	4.68	4.62	4.56	4.50
12,600	6.01	5.87	5.75	5.64	5.53	5.44	5.35	5.25	5.17	5.08	5.01	4.94	4.87	4.80	4.74	4.67	4.61
12,800	6.19	6.05	5.92	5.80	5.69	5.59	5.49	5.40	5.30	5.22	5.14	5.06	4.99	4.92	4.85	4.79	4.73
13,000	6.38	6.23	6.09	5.97	5.85	5.74	5.64	5.54	5.44	5.35	5.27	5.19	5.11	5.04	4.97	4.91	4.84
13,200	6.57	6.41	6.27	6.14	6.01	5.90	5.80	5.69	5.59	5.49	5.40	5.32	5.24	5.17	5.09	5.02	4.96
13,400	6.77	6.60	6.45	6.31	6.18	6.06	5.95	5.84	5.73	5.63	5.54	5.45	5.37	5.29	5.21	5.14	5.07
13,600	6.97	6.79	6.63	6.49	6.35	6.22	6.11	5.99	5.88	5.77	5.68	5.59	5.50	5.42	5.34	5.26	5.19
13,800	7.18	6.99	6.82	6.67	6.52	6.39	6.27	6.15	6.03	5.92	5.82	5.72	5.63	5.55	5.46	5.39	5.31
14,000	7.40	7.20	7.02	6.86	6.71	6.56	6.44	6.31	6.18	6.07	5.96	5.86	5.77	5.68	5.59	5.51	5.43
14,200	7.63	7.41	7.22	7.06	6.89	6.74	6.61	6.47	6.34	6.22	6.11	6.01	5.91	5.81	5.72	5.64	5.55
14,400	7.86	7.64	7.43	7.26	7.08	6.92	6.78	6.64	6.50	6.38	6.26	6.15	6.05	5.95	5.85	5.77	5.68
14,600	8.11	7.87	7.65	7.46	7.27	7.11	6.96	6.81	6.66	6.53	6.41	6.30	6.19	6.09	5.99	5.90	5.81
14,800	8.36	8.11	7.88	7.68	7.48	7.30	7.15	6.98	6.83	6.69	6.57	6.45	6.33	6.23	6.12	6.03	5.93
15,000	8.62	8.35	8.11	7.90	7.68	7.50	7.33	7.16	7.00	6.86	6.73	6.60	6.48	6.37	6.26	6.16	6.06
15,200	8.90	8.61	8.35	8.12	7.90	7.70	7.53	7.34	7.17	7.03	6.89	6.75	6.63	6.52	6.40	6.30	6.20
15,400	9.18	8.88	8.60	8.36	8.11	7.90	7.72	7.53	7.35	7.20	7.05	6.91	6.78	6.66	6.55	6.44	6.33
15,600	9.49	9.16	8.86	8.60	8.34	8.12	7.93	7.72	7.54	7.37	7.22	7.08	6.94	6.81	6.69	6.58	6.47
15,800	9.80	9.45	9.13	8.85	8.58	8.34	8.14	7.92	7.73	7.55	7.39	7.24	7.10	6.97	6.84	6.72	6.61
16,000	10.14	9.76	9.41	9.12	8.82	8.57	8.36	8.12	7.92	7.74	7.57	7.41	7.26	7.12	6.99	6.87	6.75
16,200	10.49	10.09	9.71	9.39	9.07	8.81	8.58	8.33	8.12	7.93	7.75	7.58	7.43	7.28	7.15	7.02	6.89
16,400	10.88	10.43	10.02	9.69	9.34	9.05	8.81	8.55	8.32	8.12	7.94	7.76	7.60	7.45	7.30	7.17	7.04
16,600	11.28	10.80	10.35	9.98	9.61	9.31	9.05	8.77	8.53	8.32	8.12	7.94	7.77	7.61	7.46	7.32	7.19
16,800	11.70	11.18	10.70	10.30	9.90	9.57	9.30	9.00	8.75	8.53	8.32	8.13	7.95	7.78	7.63	7.48	7.34
17,000	12.17	11.59	11.06	10.63	10.20	9.85	9.55	9.24	8.97	8.73	8.52	8.31	8.13	7.96	7.79	7.64	7.49
17,200	12.66	12.02	11.45	10.97	10.50	10.13	9.82	9.48	9.20	8.95	8.72	8.51	8.31	8.13	7.96	7.80	7.65
17,400	13.19	12.49	11.85	11.34	10.83	10.42	10.09	9.73	9.43	9.16	8.92	8.70	8.50	8.31	8.13	7.96	7.80
17,600	13.76	12.98	12.28	11.72	11.16	10.73	10.37	9.98	9.67	9.39	9.13	8.90	8.68	8.49	8.30	8.13	7.96
17,800	14.38	13.51	12.74	12.11	11.51	11.04	10.66	10.24	9.91	9.62	9.35	9.10	8.88	8.67	8.47	8.29	8.12
18,000	15.06	14.08	13.22	12.53	11.87	11.36	10.95	10.51	10.16	9.84	9.56	9.30	9.07	8.85	8.65	8.46	8.28
18,200	15.81	14.70	13.73	12.97	12.25	11.70	11.26	10.79	10.41	10.08	9.78	9.51	9.27	9.04	8.83	8.63	8.45
18,400	16.62	15.36	14.27	13.42	12.64	12.04	11.57	11.07	10.68	10.33	10.02	9.73	9.48	9.24	9.02	8.81	8.62
18,600	17.53	16.07	14.85	13.90	13.05	12.42	11.92	11.38	10.96	10.59	10.26	9.96	9.69	9.44	9.21	8.99	8.80
18,800	18.54	16.85	15.47	14.42	13.52	12.82	12.28	11.70	11.25	10.86	10.51	10.20	9.91	9.64	9.40	9.18	8.97
19,000	19.68	17.73	16.19	15.03	14.02	13.25	12.65	12.02	11.54	11.13	10.76	10.43	10.12	9.85	9.60	9.36	9.15
19,200	21.07	18.81	17.01	15.66	14.53	13.68	13.03	12.36	11.85	11.41	11.01	10.66	10.35	10.06	9.80	9.55	9.33
19,400	22.84	20.02	17.89	16.33	15.07	14.13	13.43	12.70	12.16	11.69	11.27	10.90	10.57	10.27	9.99	9.74	9.51
19,600	24.99	21.38	18.84	17.05	15.64	14.60	13.83	13.05	12.47	11.97	11.53	11.14	10.80	10.48	10.20	9.93	9.69
19,800	27.62	22.94	19.89	17.81	16.23	15.09	14.25	13.41	12.79	12.26	11.80	11.39	11.02	10.69	10.40	10.12	9.87
20,000	52.00	24.76	21.03	18.64	16.86	15.60	14.68	13.77	13.11	12.55	12.06	11.63	11.25	10.91	10.60	10.31	10.05
20,200	52.00	26.90	22.33	19.51	17.51	16.11	15.12	14.14	13.43	12.84	12.33	11.88	11.48	11.12	10.80	10.50	10.23
20,400	52.00	52.00	23.74	20.45	18.21	16.66	15.58	14.52	13.77	13.14	12.60	12.13	11.72	11.34	11.01	10.70	10.42
20,600	52.00	52.00	25.40	21.50	18.95	17.23	16.05	14.92	14.11	13.45	12.89	12.39	11.95	11.56	11.22	10.90	10.60
20,800	52.00	52.00	27.35	22.66	19.76	17.84	16.54	15.33	14.47	13.77	13.17	12.65	12.19	11.79	11.42	11.09	10.79
21,000	52.00	52.00	52.00	23.95	20.62	18.48	17.05	15.74	14.83	14.09	13.46	12.92	12.44	12.01	11.63	11.29	10.98
21,200	52.00	52.00	52.00	25.41	21.56	19.15	17.58	16.17	15.20	14.42	13.75	13.17	12.67	12.22	11.84	11.49	11.14
21,400	52.00	52.00	52.00	27.08	22.57	19.82	18.09	16.59	15.55	14.70	14.03	13.42	12.89	12.43	12.03	11.65	11.30
21,600	52.00	52.00	52.00	52.00	23.43	20.41	18.49	16.94	15.84	14.97	14.25	13.64	13.10	12.62	12.20	11.81	11.47
21,800	52.00	52.00	52.00	52.00	24.22	20.94	18.89	17.27	16.12	15.22	14.47	13.84	13.28	12.79	12.36	11.97	11.62
22,000	52.00	52.00	52.00	52.00	25.03	21.48	19.29	17.59	16.40	15.46	14.69	14.04	13.47	12.96	12.52	12.12	11.76
22,200	52.00	52.00	52.00	52.00	25.90	22.05	19.72	17.93	16.68	15.71	14.92	14.24	13.66	13.14	12.69	12.28	11.91
22,400	52.00	52.00	52.00	52.00	26.83	22.64	20.15	18.27	16.97	15.96	15.14	14.45	13.84	13.32	12.85	12.44	12.06
22,600	52.00	52.00	52.00	52.00	27.84	23.26	20.60	18.62	17.27	16.22	15.37	14.66	14.04	13.49	13.02	12.59	12.21
22,800	52.00	52.00	52.00	52.00	52.00	23.92	21.07	18.99	17.57	16.48	15.60	14.87	14.23	13.67	13.19	12.75	12.36
23,000	52.00	52.00	52.00	52.00	52.00	24.62	21.56	19.36	17.87	16.74	15.84	15.08	14.42	13.85	13.35	12.91	12.50
23,200	52.00	52.00	52.00	52.00	52.00	25.35	22.06	19.74	18.19	17.01	16.08	15.30	14.62	14.03	13.52	13.07	12.66
23,400	52.00	52.00	52.00	52.00	52.00	26.13	22.59	20.13	18.50	17.29	16.32	15.51	14.82	14.22	13.69	13.23	12.81
23,600	52.00	52.00	52.00	52.00	52.00	26.97	23.15	20.53	18.83	17.56	16.56	15.73	15.02	14.40	13.87	13.39	12.96
23,800	52.00	52.00	52.00	52.00	52.00	27.88	23.72	20.95	19.17	17.85	16.81	15.95	15.22	14.59	14.04	13.55	13.12
24,000	52.00	52.00	52.00	52.00	52.00	28.85	24.33	21.38	19.51	18.14	17.06	16.18	15.43	14.78	14.21	13.72	13.27
24,200	52.00	52.00	52.00	52.00	52.00	52.00	24.97	21.83	19.86	18.43	17.32	16.41	15.64	14.97	14.39	13.88	13.43
24,400	52.00	52.00	52.00	52.00	52.00	52.00	25.64	22.29	20.23	18.73	17.58	16.64	15.85	15.16	14.57	14.05	13.58
24,600	52.00	52.00	52.00	52.00	52.00	52.00	26.34	22.78	20.60	19.04	17.84	16.88	16.06	15.35	14.75	14.22	13.74
24,800	52.00	52.00	52.00	52.00	52.00	52.00	27.10	23.28	20.98	19.35	18.11	17.11	16.27	15.55	14.93	14.39	13.90
25,000	52.00	52.00	52.00	52.00	52.00	52.00	27.91	23.80	21.37	19.67	18.38	17.36	16.49	15.75	15.11	14.55	14.06
25,200	52.00	52.00	52.00	52.00	52.00	52.00	28.77	24.34	21.78	20.00	18.66	17.60	16.71	15.95	15.29	14.73	14.22
25,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	24.91	22.19	20.33	18.94	17.85	16.93	16.15	15.48	14.90	14.38
25,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	25.50	22.63	20.68	19.24	18.11	17.17	16.36	15.68	15.08	14.55
25,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	26.21	23.12	21.07	19.56	18.40	17.42	16.58	15.88	15.28	14.74
26,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.07	23.72	21.53	19.94	18.71	17.70	16.84	16.10	15.48	14.93
26,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	28.02	24.35	22.01	20.33	19.05	17.99	17.10	16.34	15.70	15.13
26,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	28.99	25.02	22.51	20.74	19.39	18.29	17.37	16.58	15.92	15.33
26,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	30.04	25.72	23.03	21.16	19.74	18.60	17.64	16.82	16.14	15.54
26,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	26.45	23.56	21.58	20.10	18.91	17.91	17.07	16.36	15.74
27,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.20	24.11	22.01	20.45	19.22	18.18	17.31	16.59	15.95
27,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.99	24.67	22.44	20.82	19.53	18.46	17.56	16.81	16.15
27,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	28.83	25.25	22.89	21.19	19.84	18.73	17.80	17.03	16.36
27,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	29.71	25.85	23.35	21.56	20.16	19.01	18.05	17.26	16.57
27,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	30.65	26.47	23.83	21.94	20.49	19.30	18.31	17.49	16.78
28,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.13	24.32	22.34	20.82	19.59	18.56	17.72	16.99
28,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.82	24.82	22.74	21.16	19.88	18.82	17.95	17.20
28,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	28.53	25.34	23.15	21.50	20.18	19.08	18.18	17.41
28,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	29.27	25.87	23.56	21.84	20.47	19.34	18.41	17.63
28,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	30.04	26.42	23.99	22.20	20.77	19.61	18.65	17.84
29,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	30.87	26.99	24.43	22.56	21.08	19.88	18.89	18.06
29,200	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	27.59	24.88	22.93	21.39	20.15	19.13	18.28
29,400	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	28.21	25.34	23.31	21.71	20.42	19.37	18.50
29,600	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	28.86	25.83	23.70	22.04	20.71	19.63	18.74
29,800	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	29.57	26.35	24.11	22.39	21.01	19.89	18.97
30,000	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	30.33	26.89	24.54	22.74	21.31	20.16	19.21

Flow through WRRCS (cfs)	916.6	916.8	917.0	917.2	917.4	917.6	917.8	918.0	918.2	918.4	918.6	918.8	919.0	919.2	919.4	919.6	919.8	920.0	920.2
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.23
800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.27
900	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.30
1,000	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.34
1,100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.37
1,200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.40	0.40
1,300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.44	0.44
1,400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.47	0.47
1,500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.50	0.50
1,600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.54	0.54
1,700	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.57	0.57
1,800	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.61	0.61	0.60	0.60
1,900	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.64	0.64	0.64	0.64
2,000	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.67	0.67	0.67	0.67
2,100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.71	0.71	0.70	0.70
2,200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.74	0.74	0.74	0.74
2,300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.77	0.77	0.77	0.77
2,400	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.80
2,500	0.86	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.84	0.84
2,600	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.87	0.87	0.87
2,700	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.90
2,800	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94
2,900	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.97
3,000	1.03	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01	1.01
3,100	1.07	1.07	1.06	1.06	1.06	1.06	1.06	1.06	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04
3,200	1.10	1.10	1.10	1.10	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.08	1.08	1.07	1.07
3,300	1.14	1.13	1.13	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11
3,400	1.17	1.17	1.17	1.17	1.16	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14
3,500	1.21	1.20	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.19	1.19	1.18	1.18	1.18	1.18	1.18	1.17	1.17
3,600	1.24	1.24	1.24	1.23	1.23	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21
3,700	1.27	1.27	1.27	1.27	1.27	1.26	1.26	1.26	1.26	1.26	1.25	1.25	1.25	1.25	1.25	1.25	1.24	1.24	1.24
3,800	1.31	1.31	1.30	1.30	1.30	1.30	1.30	1.29	1.29	1.29	1.29	1.29	1.28	1.28	1.28	1.28	1.28	1.28	1.27
3,900	1.34	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.33	1.32	1.32	1.32	1.32	1.32	1.31	1.31	1.31	1.31	1.31
4,000	1.38	1.38	1.37	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.36	1.35	1.35	1.35	1.35	1.35	1.34	1.34	1.34
4,100	1.41	1.41	1.41	1.41	1.40	1.40	1.40	1.40	1.39	1.39	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.38	1.37
4,200	1.45	1.44	1.44	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.42	1.42	1.41	1.41	1.41	1.41
4,300	1.48	1.48	1.48	1.47	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.46	1.45	1.45	1.45	1.45	1.45	1.44	1.44
4,400	1.52	1.51	1.51	1.51	1.51	1.50	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.49	1.48	1.48	1.48	1.48	1.47
4,500	1.55	1.55	1.54	1.54	1.54	1.54	1.54	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.52	1.51	1.51	1.51	1.51
4,600	1.58	1.58	1.58	1.58	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.56	1.56	1.55	1.55	1.55	1.55	1.54	1.54
4,700	1.62	1.62	1.61	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.59	1.59	1.59	1.59	1.58	1.58	1.58	1.58	1.58
4,800	1.65	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.63	1.63	1.63	1.63	1.62	1.62	1.62	1.62	1.61	1.61	1.61
4,900	1.69	1.68	1.68	1.68	1.68	1.67	1.67	1.67	1.67	1.66	1.66	1.66	1.66	1.65	1.65	1.65	1.65	1.64	1.64
5,000	1.72	1.72	1.72	1.71	1.71	1.71	1.71	1.70	1.70	1.70	1.70	1.69	1.69	1.69	1.69	1.68	1.68	1.68	1.68
5,200	1.79	1.79	1.79	1.78	1.78	1.78	1.77	1.77	1.77	1.77	1.76	1.76	1.76	1.76	1.75	1.75	1.75	1.75	1.74
5,400	1.86	1.86	1.85	1.85	1.85	1.85	1.84	1.84	1.84	1.83	1.83	1.83	1.83	1.82	1.82	1.82	1.82	1.81	1.81
5,600	1.93	1.93	1.92	1.92	1.92	1.91	1.91	1.91	1.90	1.90	1.90	1.90	1.89	1.89	1.89	1.89	1.88	1.88	1.88
5,800	2.00	1.99	1.99	1.99	1.98	1.98	1.98	1.98	1.97	1.97	1.97	1.96	1.96	1.96	1.96	1.95	1.95	1.95	1.94
6,000	2.07	2.06	2.06	2.06	2.05	2.05	2.05	2.04	2.04	2.04	2.03	2.03	2.03	2.03	2.02	2.02	2.02	2.01	2.01
6,200	2.14	2.13	2.13	2.13	2.12	2.12	2.12	2.11	2.11	2.11	2.10	2.10	2.10	2.09	2.09	2.09	2.08	2.08	2.08
6,400	2.20	2.20	2.20	2.19	2.19	2.19	2.18	2.18	2.18	2.17	2.17	2.17	2.16	2.16	2.16	2.15	2.15	2.15	2.15
6,600	2.27	2.27	2.26	2.26	2.26	2.26	2.25	2.25	2.25	2.24	2.24	2.24	2.23	2.23	2.23	2.22	2.22	2.22	2.21
6,800	2.33	2.33	2.33	2.33	2.33	2.32	2.32	2.32	2.31	2.31	2.31	2.30	2.30	2.30	2.29	2.29	2.29	2.28	2.28
7,000	2.39	2.39	2.40	2.40	2.40	2.39	2.39	2.38	2.38	2.38	2.37	2.37	2.37	2.36	2.36	2.36	2.35	2.35	2.35
7,200	2.45	2.45	2.46	2.46	2.46	2.45	2.45	2.45	2.45	2.45	2.44	2.44	2.43	2.43	2.43	2.42	2.42	2.42	2.41
7,400	2.52	2.51	2.52	2.52	2.52	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.50	2.50	2.50	2.49	2.49	2.48	2.48
7,600	2.58	2.57	2.57	2.57	2.57	2.57	2.57	2.58	2.58	2.58	2.58	2.57	2.57	2.57	2.56	2.56	2.56	2.55	2.55
7,800	2.64	2.64	2.64	2.63	2.63	2.63	2.64	2.64	2.64	2.64	2.64	2.64	2.63	2.63	2.63	2.63	2.62	2.62	2.61
8,000	2.70	2.70	2.70	2.70	2.70	2.69	2.69	2.69	2.70	2.70	2.70	2.70	2.69	2.69	2.69	2.69	2.69	2.69	2.68
8,200	2.77	2.76	2.76	2.76	2.76	2.76	2.75	2.75	2.75	2.75	2.76	2.75	2.76	2.76	2.76	2.76	2.76	2.75	2.75
8,400	2.83	2.83	2.82	2.82	2.82	2.82	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.82	2.82	2.82	2.82	2.82	2.81
8,600	2.90	2.90	2.89	2.89	2.88	2.88	2.88	2.88	2.88	2.87	2.87	2.87	2.87	2.87	2.88	2.88	2.88	2.88	2.87
8,800	2.97	2.96	2.96	2.95	2.95	2.94	2.94	2.94	2.94	2.93	2.93	2.93	2.93	2.93	2.93	2.93	2.94	2.93	2.94
9,000	3.04	3.03	3.02	3.02	3.01	3.01	3.00	3.00	3.00	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.00
9,200	3.11	3.10	3.09	3.09	3.08	3.07	3.07	3.06	3.06	3.06	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
9,400	3.18	3.17	3.16	3.16	3.15	3.14	3.14	3.13	3.13	3.12	3.12	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11
9,600	3.26	3.25	3.24	3.23	3.22	3.21	3.20	3.19	3.19	3.18	3.18	3.18	3.17	3.17	3.17	3.17	3.17	3.17	3.17
9,800	3.33	3.32	3.31	3.30	3.29	3.28	3.27	3.26	3.26	3.25	3.24	3.24	3.24	3.23	3.23	3.23	3.23	3.23	3.22
10,000	3.41	3.40	3.38	3.37	3.36	3.35	3.34	3.33	3.32	3.32	3.31	3.30	3.30	3.30	3.29	3.29	3.29	3.29	3.28
10,200	3.49	3.47	3.46	3.44	3.43	3.42	3.41	3.40	3.39	3.38	3.38	3.37	3.36	3.36	3.35	3.35	3.35	3.35	3.34
10,400	3.57	3.55	3.54	3.52	3.51	3.49	3.48	3.47	3.46	3.45	3.44	3.44	3.43	3.42	3.42	3.41	3.41	3.41	3.40
10,600	3.65	3.63	3.61	3.60	3.58	3.57	3.55	3.54	3.53	3.52	3.51	3.50	3.50	3.49	3.48	3.48	3.47	3.47	3.47
10,800	3.73	3.71	3.69	3.67	3.66	3.64	3.63	3.61	3.60	3.59	3.58	3.57	3.56	3.56	3.55	3.54	3.54	3.53	3.53
11,000	3.82	3.79	3.77	3.75	3.74	3.72	3.70	3.69	3.68	3.66	3.65	3.64	3.63	3.62	3.61	3.61	3.60	3.59	3.59
11,200	3.90	3.88	3.85	3.83	3.81	3.80	3.78	3.76	3.75	3.73	3.72	3.71	3.70	3.69	3.68	3.67	3.67	3.66	3.65
11,400	3.99	3.96	3.94	3.92	3.89	3.87	3.86	3.84	3.82	3.81	3.79	3.78	3.77	3.76	3.75	3.74	3.73	3.73	3.72
11,600	4.08	4.05	4.02	4.00	3.97	3.95	3.93	3.92	3.90	3.88	3.87	3.85	3.84	3.83	3.82	3.81	3.80	3.79	3.78
11,800	4.16	4.13	4.11	4.08	4.06	4.03	4.01	3.99	3.97	3.96	3.94	3.93	3.91	3.90	3.89	3.88	3.87	3.86	3.85
12,000	4.26	4.22	4.19	4.17	4.14	4.12	4.09	4.07	4.05	4.03	4.01	4.00	3.98	3.97	3.96	3.94	3.93	3.92	3.92
12,200	4.35	4.31	4.28	4.25	4.22	4.20	4.17	4.15	4.13	4.11	4.09	4.07	4.06	4.04	4.03	4.01	4.00	3.99	3.98
12,400	4.45	4.40	4.37	4.34	4.31	4.28	4.26	4.23	4.21	4.19	4.17	4.15	4.13	4.11	4.10	4.09	4.07	4.06	4.05
12,600	4.56	4.51	4.46	4.43	4.39	4.37	4.34	4.31	4.29	4.26	4.24	4.22	4.20	4.19	4.17	4.16	4.14	4.13	4.12
12,800	4.67	4.61	4.56	4.52	4.48	4.45	4.42	4.39	4.37	4.34	4.32	4.30	4.28	4.26	4.24	4.23	4.21	4.20	4.19
13,000	4.78	4.72	4.66	4.61	4.57	4.54	4.51	4.48	4.45	4.42	4.40	4.38	4.36	4.34	4.32	4.30	4.28	4.27	4.26
13,200	4.89	4.83	4.77	4.71	4.67	4.63	4.59	4.56	4.53	4.51	4.48	4.46	4.43	4.41	4.39	4.37	4.36	4.34	4.33
13,400	5.00	4.94	4.88	4.82	4.76	4.72	4.68	4.65	4.62	4.59	4.56	4.53	4.51	4.49	4.47	4.45	4.43	4.41	4.40
13,600	5.12	5.05	4.99	4.93	4.87	4.81	4.77	4.73	4.70	4.67	4.64	4.61	4.59	4.56	4.54	4.52	4.50	4.48	4.47
13,800	5.24	5.17	5.10	5.04	4.98	4.92	4.86	4.82	4.79	4.75	4.72	4.69	4.67	4.64	4.62	4.60	4.58	4.56	4.54
14,000	5.36	5.28	5.21	5.15	5.08	5.02	4.96	4.91	4.87	4.84	4.81	4.78	4.75	4.72	4.70	4.67	4.65	4.63	4.61
14,200	5.48	5.40	5.33	5.26	5.19	5.13	5.07	5.01	4.96	4.92	4.89	4.86	4.83	4.80	4.77	4.75	4.73	4.71	4.69
14,400	5.60	5.52	5.44	5.37	5.30	5.24	5.17	5.11	5.05	5.01	4.98	4.94	4.91	4.88	4.85	4.83	4.80	4.78	4.76
14,600	5.72	5.64	5.56	5.49	5.42	5.35	5.28	5.22	5.16	5.11	5.06	5.03	4.99	4.96	4.93	4.91	4.88	4.86	4.83
14,800	5.85	5.76	5.68	5.60	5.53	5.46	5.39	5.33	5.26	5.20	5.15	5.11	5.08	5.04	5.01	4.99	4.96	4.93	4.91
15,000	5.97	5.88	5.80	5.72	5.64	5.57	5.50	5.43	5.37	5.30	5.24	5.20	5.16	5.13	5.10	5.07	5.04	5.01	4.98
15,200	6.10	6.01	5.92	5.84	5.76	5.68	5.61	5.54	5.47	5.41	5.35	5.29	5.25	5.21	5.18	5.15	5.12	5.09	5.06
15,400	6.23	6.14	6.05	5.96	5.88	5.80	5.72	5.65	5.58	5.51	5.45	5.39	5.34	5.30	5.26	5.23	5.20	5.17	5.14
15,600	6.36	6.26	6.17	6.08	6.00	5.92	5.84	5.76	5.69	5.62	5.55	5.49	5.43	5.38	5.34	5.31	5.28	5.25	5.22
15,800	6.50	6.40	6.30	6.21	6.12	6.03	5.95	5.88	5.80	5.73	5.66	5.59	5.53	5.47	5.43	5.39	5.36	5.33	5.30
16,000	6.64	6.53	6.43	6.33	6.24	6.15	6.07	5.99	5.91	5.84	5.77	5.70	5.63	5.57	5.52	5.48	5.44	5.41	5.38
16,200	6.78	6.66	6.56	6.46	6.37	6.27	6.19	6.11	6.02	5.95	5.88	5.80	5.74	5.67	5.61	5.56	5.53	5.49	5.46
16,400	6.92	6.80	6.69	6.59	6.49	6.40	6.31	6.22	6.14	6.06	5.98	5.91	5.84	5.77	5.71	5.65	5.61	5.57	5.54
16,600	7.06	6.94	6.83	6.72	6.62	6.52	6.43	6.34	6.26	6.17	6.10	6.02	5.95	5.88	5.81	5.75	5.70	5.66	5.62
16,800	7.21	7.08	6.96	6.85	6.75	6.65	6.55	6.46	6.37	6.29	6.21	6.13	6.06	5.98	5.92	5.85	5.79	5.74	5.70
17,000	7.35	7.22	7.10	6.99	6.88	6.77	6.67	6.58	6.49	6.40	6.32	6.24	6.16	6.09	6.02	5.95	5.89	5.83	5.79
17,200	7.50	7.37	7.24	7.12	7.01	6.90	6.80	6.70	6.61	6.52	6.43	6.35	6.27	6.20	6.12	6.05	5.99	5.92	5.87
17,400	7.65	7.51	7.38	7.26	7.14	7.03	6.92	6.82	6.73	6.63	6.55	6.46	6.38	6.30	6.23	6.16	6.09	6.02	5.96
17,600	7.81	7.66	7.52	7.40	7.28	7.16	7.05	6.95	6.85	6.75	6.66	6.57	6.49	6.41	6.33	6.26	6.19	6.12	6.05
17,800	7.96	7.81	7.67	7.54	7.41	7.29	7.18	7.07	6.97	6.87	6.78	6.69	6.60	6.52	6.44	6.36	6.29	6.22	6.15
18,000	8.12	7.96	7.81	7.68	7.55	7.42	7.31	7.20	7.09	6.99	6.89	6.80	6.71	6.63	6.55	6.47	6.39	6.32	6.25
18,200	8.28	8.11	7.96	7.82	7.69	7.56	7.44	7.33	7.22	7.11	7.01	6.92	6.83	6.74	6.66	6.58	6.50	6.42	6.35
18,400	8.44	8.27	8.12	7.97	7.83	7.70	7.58	7.46	7.34	7.24	7.14	7.04	6.94	6.85	6.77	6.69	6.61	6.53	6.45
18,600	8.61	8.43	8.27	8.12	7.97	7.84	7.71	7.59	7.47	7.36	7.26	7.15	7.06	6.97	6.88	6.79	6.71	6.63	6.56
18,800	8.78	8.59	8.42	8.27	8.12	7.98	7.85	7.72	7.60	7.49	7.38	7.27	7.17	7.08	6.99	6.90	6.82	6.74	6.66
19,000	8.95	8.76	8.58	8.42	8.27	8.12	7.98	7.85	7.73	7.61	7.50	7.39	7.29	7.19	7.10	7.01	6.92	6.84	6.76
19,200	9.12	8.92	8.74	8.57	8.41	8.26	8.12	7.99	7.86	7.74	7.62	7.51	7.41	7.31	7.21	7.12	7.03	6.95	6.86
19,400	9.29	9.08	8.90	8.72	8.56	8.40	8.26	8.12	7.99	7.86	7.75	7.63	7.52	7.42	7.32	7.23	7.14	7.05	6.97
19,600	9.46	9.25	9.06	8.88	8.71	8.55	8.40	8.25	8.12	7.99	7.87	7.75	7.64	7.54	7.44	7.34	7.24	7.16	7.07
19,800	9.63	9.42	9.21	9.03	8.85	8.69	8.53	8.39	8.25	8.12	7.99	7.87	7.76	7.65	7.55	7.45	7.35	7.26	7.17
20,000	9.81	9.58	9.37	9.18	9.00	8.83	8.67	8.52	8.38	8.24	8.11	7.99	7.87	7.76	7.66	7.55	7.46	7.36	7.27
20,200	9.98	9.75	9.53	9.33	9.15	8.97	8.81	8.65	8.51	8.37	8.23	8.11	7.99	7.88	7.77	7.66	7.56	7.47	7.37
20,400	10.16	9.91	9.69	9.49	9.30	9.11	8.95	8.79	8.64	8.49	8.36	8.23	8.11	7.99	7.88	7.77	7.67	7.57	7.48
20,600	10.33	10.08	9.85	9.64	9.44	9.26	9.08	8.92	8.77	8.62	8.48	8.35	8.22	8.10	7.99	7.88	7.78	7.68	7.58
20,800	10.51	10.26	10.01	9.80	9.59	9.40	9.22	9.06	8.90	8.75	8.61	8.47	8.34	8.22	8.11	8.00	7.89	7.79	7.68
21,000	10.68	10.43	10.16	9.96	9.75	9.55	9.37	9.20	9.03	8.87	8.73	8.60	8.46	8.33	8.22	8.10	7.99	7.88	7.78
21,200	10.85	10.58	10.31	10.10	9.89	9.68	9.49	9.32	9.15	8.99	8.84	8.70	8.56	8.43	8.31	8.19	8.08	7.97	7.87
21,400	11.01	10.72	10.47	10.22	10.01	9.80	9.61	9.43	9.26	9.10	8.94	8.80	8.66	8.53	8.41	8.29	8.17	8.06	7.96
21,600	11.15	10.86	10.60	10.35	10.13	9.92	9.72	9.54	9.36	9.20	9.04	8.90	8.76	8.62	8.50	8.38	8.26	8.15	8.04
21,800	11.29	11.00	10.73	10.48	10.25	10.04	9.83	9.65	9.47	9.30	9.15	9.00	8.85	8.72	8.59	8.47	8.35	8.24	8.13
22,000	11.43	11.13	10.86	10.60	10.37	10.15	9.95	9.76	9.58	9.41	9.25	9.10	8.95	8.82	8.68	8.56	8.44	8.33	8.22
22,200	11.57	11.27	10.99	10.73	10.49	10.27	10.06	9.87	9.68	9.51	9.35	9.20	9.05	8.91	8.78	8.65	8.53	8.42	8.30
22,400	11.71	11.40	11.12	10.85	10.61	10.39	10.18	9.98	9.79	9.62	9.45	9.30	9.15	9.01	8.87	8.74	8.62	8.50	8.39
22,600	11.85	11.54	11.25	10.98	10.73	10.50	10.29	10.09	9.90	9.72	9.55	9.40	9.24	9.10	8.97	8.84	8.71	8.59	8.48
22,800	12.00	11.67	11.38	11.10	10.86	10.62	10.40	10.20	10.01	9.83	9.66	9.50	9.34	9.20	9.06	8.93	8.80	8.68	8.57
23,000	12.14	11.81	11.51	11.23	10.98	10.74	10.52	10.31	10.12	9.93	9.76	9.60	9.44	9.29	9.15	9.02	8.89	8.77	8.65
23,200	12.28	11.94	11.64	11.36	11.10	10.86	10.63	10.42	10.22	10.04	9.86	9.70	9.54	9.39	9.25	9.11	8.98	8.86	8.74
23,400	12.43	12.08	11.77	11.48	11.22	10.97	10.75	10.53	10.33	10.14	9.97	9.80	9.64	9.49	9.34	9.21	9.07	8.95	8.83
23,600	12.57	12.22	11.90	11.61	11.35	11.09	10.86	10.65	10.44	10.25	10.07	9.90	9.74	9.58	9.44	9.30	9.17	9.04	8.92
23,800	12.72	12.36	12.04	11.74	11.47	11.21	10.98	10.76	10.55	10.36	10.17	10.00	9.84	9.68	9.53	9.39	9.26	9.13	9.00
24,000	12.87	12.50	12.17	11.87	11.59	11.33	11.09	10.87	10.66	10.46	10.28	10.10	9.93	9.78	9.63	9.48	9.35	9.22	9.09
24,200	13.01	12.64	12.30	12.00	11.72	11.45	11.21	10.98	10.77	10.57	10.38	10.20	10.03	9.87	9.72	9.58	9.44	9.31	9.18
24,400	13.16	12.78	12.44	12.13	11.84	11.57	11.33	11.10	10.88	10.68	10.49	10.31	10.13	9.97	9.82	9.67	9.53	9.40	9.27
24,600	13.31	12.92	12.57	12.26	11.97	11.70	11.44	11.21	10.99	10.79	10.59	10.41	10.23	10.07	9.91	9.77	9.62	9.49	9.36
24,800	13.46	13.07	12.71	12.39	12.09	11.82	11.56	11.33	11.10	10.89	10.70	10.51	10.33	10.17	10.01	9.86	9.72	9.58	9.45
25,000	13.61	13.21	12.85	12.52	12.22	11.94	11.68	11.44	11.21	11.00	10.80	10.62	10.44	10.27	10.11	9.95	9.81	9.67	9.54
25,200	13.76	13.35	12.98	12.66	12.35	12.06	11.80	11.56	11.32	11.11	10.91	10.72	10.54	10.36	10.21	10.05	9.90	9.76	9.62
25,400	13.91	13.50	13.13	12.79	12.47	12.19	11.92	11.68	11.44	11.23	11.01	10.83	10.65	10.46	10.31	10.15	9.99	9.85	9.72
25,600	14.08	13.66	13.28	12.92	12.61	12.32	12.04	11.80	11.55	11.34	11.13	10.93	10.75	10.57	10.41	10.25	10.10	9.95	9.81
25,800	14.25	13.82	13.43	13.07	12.76	12.45	12.18	11.92	11.68	11.46	11.25	11.04	10.86	10.68	10.51	10.36	10.20	10.05	9.91
26,000	14.43	13.98	13.58	13.23	12.90	12.59	12.32	12.05	11.81	11.58	11.37	11.16	10.97	10.79	10.62	10.46	10.30	10.15	10.01
26,200	14.62	14.16	13.75	13.39	13.05	12.74	12.45	12.19	11.94	11.70	11.49	11.28	11.09	10.90	10.73	10.56	10.41	10.25	10.11
26,400	14.81	14.34	13.92	13.54	13.20	12.89	12.59	12.32	12.07	11.83	11.61	11.40	11.20	11.01	10.84	10.67	10.51	10.36	10.21
26,600	15.00	14.52	14.09	13.71	13.36	13.03	12.73	12.46	12.20	11.96	11.73	11.52	11.32	11.13	10.95	10.78	10.61	10.46	10.31
26,800	15.19	14.70	14.26	13.87	13.51	13.18	12.87	12.59	12.33	12.08	11.85	11.64	11.43	11.24	11.06	10.88	10.72	10.56	10.41
27,000	15.38	14.88	14.43	14.03	13.66	13.32	13.01	12.73	12.46	12.21	11.98	11.76	11.55	11.35	11.17	10.99	10.82	10.66	10.51
27,200	15.57	15.06	14.60	14.19	13.81	13.47	13.15	12.86	12.59	12.34	12.10	11.87	11.66	11.47	11.28	11.10	10.93	10.77	10.61
27,400	15.76	15.24	14.77	14.35	13.97	13.62	13.29	13.00	12.72	12.46	12.22	11.99	11.78	11.58	11.39	11.21	11.03	10.87	10.71
27,600	15.96	15.42	14.94	14.51	14.12	13.76	13.44	13.13	12.85	12.59	12.34	12.11	11.89	11.69	11.50	11.31	11.14	10.97	10.81
27,800	16.15	15.60	15.11	14.67	14.28	13.91	13.58	13.27	12.98	12.72	12.47	12.23	12.01	11.80	11.61	11.42	11.24	11.07	10.91
28,000	16.35	15.78	15.28	14.83	14.43	14.06	13.72	13.41	13.11	12.84	12.59	12.35	12.13	11.92	11.72	11.53	11.35	11.17	11.01
28,200	16.54	15.96	15.45	15.00	14.58	14.21	13.86	13.54	13.25	12.97	12.71	12.47	12.24	12.03	11.83	11.63	11.45	11.28	11.11
28,400	16.74	16.15	15.62	15.16	14.74	14.35	14.00	13.68	13.38	13.10	12.83	12.59	12.36	12.14	11.94	11.74	11.56	11.38	11.21
28,600	16.94	16.33	15.79	15.32	14.89	14.50	14.14	13.81	13.51	13.22	12.96	12.71	12.47	12.25	12.05	11.85	11.66	11.48	11.31
28,800	17.14	16.51	15.97	15.49	15.05	14.65	14.29	13.95	13.64	13.35	13.08	12.83	12.59	12.37	12.16	11.96	11.77	11.59	11.41
29,000	17.34	16.70	16.14	15.65	15.21	14.80	14.43	14.09	13.77	13.48	13.21	12.95	12.71	12.48	12.27	12.06	11.87	11.69	11.51
29,200	17.54	16.89	16.32	15.82	15.37	14.95	14.58	14.23	13.91	13.61	13.33	13.07	12.83	12.60	12.38	12.17	11.98	11.79	11.62
29,400	17.75	17.08	16.50	15.99	15.52	15.11	14.72	14.37	14.04	13.74	13.46	13.19	12.94	12.71	12.49	12.29	12.08	11.90	11.72
29,600	17.96	17.28	16.68	16.16	15.69	15.26	14.87	14.51	14.18	13.87	13.58	13.32	13.06	12.83	12.61	12.40	12.19	12.00	11.82
29,800	18.17	17.48	16.87	16.34	15.86	15.42	15.02	14.65	14.32	14.00	13.71	13.44	13.19	12.95	12.72	12.51	12.30	12.11	11.93
30,000	18.39	17.68	17.06	16.51	16.02	15.58	15.17	14.80	14.46	14.14	13.84	13.57	13.31	13.07	12.84	12.62	12.41	12.22	12.03

Table 6 Red River Control Structure (RRCS) Gate Opening (ft) - Part E

Flow through WRRCS (cfs)	Staging Area Elevation at Red River, $Z_{STAGING-AREA-RR}$ (ft)																							
	920.4	920.6	920.8	921.0	921.2	921.4	921.6	921.8	922.0	922.2	922.4	922.6	922.8	923.0	923.2	923.4	923.6	923.8	924.0	924.2	924.4	924.6	924.8	925.0
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
600	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
700	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
800	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
900	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
1,000	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.32	0.32
1,100	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
1,200	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
1,300	0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.42
1,400	0.47	0.47	0.47	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.45	0.45
1,500	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
1,600	0.54	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
1,700	0.57	0.57	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.55	0.55	0.55	0.55	0.55
1,800	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.58
1,900	0.64	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
2,000	0.67	0.67	0.67	0.67	0.67	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
2,100	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.68
2,200	0.74	0.74	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.71	0.71
2,300	0.77	0.77	0.77	0.77	0.77	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
2,400	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.78	0.78	0.78	0.78	0.78	0.78	0.78
2,500	0.84	0.84	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.81	0.81	0.81	0.81
2,600	0.87	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.84	0.84
2,700	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
2,800	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91
2,900	0.97	0.97	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94
3,000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.97
3,100	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
3,200	1.07	1.07	1.07	1.07	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04	1.04
3,300	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.09	1.09	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.07	1.07	1.07	1.07
3,400	1.14	1.14	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10
3,500	1.17	1.17	1.17	1.17	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.14	1.14
3,600	1.20	1.20	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.18	1.18	1.18	1.18	1.18	1.18	1.17	1.17	1.17	1.17	1.17
3,700	1.24	1.24	1.23	1.23	1.23	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.20	1.20	1.20
3,800	1.27	1.27	1.27	1.27	1.26	1.26	1.26	1.26	1.26	1.26	1.25	1.25	1.25	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.24	1.24	1.23	1.23
3,900	1.31	1.30	1.30	1.30	1.30	1.30	1.29	1.29	1.29	1.29	1.29	1.29	1.28	1.28	1.28	1.28	1.28	1.28	1.27	1.27	1.27	1.27	1.27	1.27
4,000	1.34	1.34	1.33	1.33	1.33	1.33	1.33	1.33	1.32	1.32	1.32	1.32	1.32	1.32	1.31	1.31	1.31	1.31	1.31	1.30	1.30	1.30	1.30	1.30
4,100	1.37	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.36	1.36	1.35	1.35	1.35	1.35	1.35	1.34	1.34	1.34	1.34	1.34	1.34	1.33	1.33	1.33
4,200	1.41	1.40	1.40	1.40	1.40	1.40	1.39	1.39	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.38	1.38	1.37	1.37	1.37	1.37	1.37	1.36	1.36
4,300	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.42	1.42	1.41	1.41	1.41	1.41	1.41	1.40	1.40	1.40	1.40	1.40	1.39
4,400	1.47	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.46	1.45	1.45	1.45	1.45	1.45	1.44	1.44	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.43
4,500	1.51	1.50	1.50	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.49	1.48	1.48	1.48	1.48	1.48	1.47	1.47	1.47	1.47	1.47	1.46	1.46	1.46
4,600	1.54	1.54	1.54	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.52	1.52	1.51	1.51	1.51	1.51	1.51	1.50	1.50	1.50	1.50	1.50	1.49	1.49
4,700	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.56	1.56	1.55	1.55	1.55	1.55	1.55	1.54	1.54	1.54	1.54	1.53	1.53	1.53	1.53	1.53	1.52
4,800	1.61	1.60	1.60	1.60	1.60	1.60	1.59	1.59	1.59	1.59	1.58	1.58	1.58	1.58	1.58	1.57	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.56
4,900	1.64	1.64	1.64	1.63	1.63	1.63	1.63	1.62	1.62	1.62	1.62	1.62	1.61	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.60	1.59	1.59	1.59
5,000	1.67	1.67	1.67	1.67	1.66	1.66	1.66	1.66	1.65	1.65	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.63	1.63	1.63	1.63	1.63	1.62	1.62
5,200	1.74	1.74	1.74	1.73	1.73	1.73	1.73	1.72	1.72	1.72	1.72	1.71	1.71	1.71	1.71	1.70	1.70	1.70	1.70	1.70	1.69	1.69	1.69	1.69
5,400	1.81	1.80	1.80	1.80	1.80	1.79	1.79	1.79	1.79	1.78	1.78	1.78	1.78	1.78	1.77	1.77	1.77	1.77	1.76	1.76	1.76	1.76	1.75	1.75
5,600	1.87	1.87	1.87	1.87	1.86	1.86	1.86	1.86	1.85	1.85	1.85	1.85	1.84	1.84	1.84	1.84	1.83	1.83	1.83	1.83	1.82	1.82	1.82	1.82
5,800	1.94	1.94	1.94	1.93	1.93	1.93	1.93	1.92	1.92	1.92	1.91	1.91	1.91	1.91	1.90	1.90	1.90	1.90	1.89	1.89	1.89	1.89	1.88	1.88
6,000	2.01	2.01	2.00	2.00	2.00	1.99	1.99	1.99	1.99	1.98	1.98	1.98	1.98	1.97	1.97	1.97	1.96	1.96	1.96	1.96	1.95	1.95	1.95	1.95
6,200	2.08	2.07	2.07	2.07	2.06	2.06	2.06	2.05	2.05	2.05	2.05	2.04	2.04	2.04	2.04	2.03	2.03	2.03	2.02	2.02	2.02	2.02	2.01	2.01
6,400	2.14	2.14	2.14	2.13	2.13	2.13	2.12	2.12	2.12	2.12	2.11	2.11	2.11	2.10	2.10	2.10	2.10	2.09	2.09	2.09	2.08	2.08	2.08	2.08
6,600	2.21	2.21	2.20	2.20	2.20	2.19	2.19	2.19	2.18	2.18	2.18	2.18	2.17	2.17	2.17	2.16	2.16	2.16	2.16	2.15	2.15	2.15	2.14	2.14
6,800	2.28	2.27	2.27	2.27	2.26	2.26	2.26	2.25	2.25	2.25	2.24	2.24	2.24	2.24	2.23	2.23	2.23	2.22	2.22	2.22	2.21	2.21	2.21	2.21
7,000	2.34	2.34	2.34	2.33	2.33	2.33	2.32	2.32	2.32	2.31	2.31	2.31	2.30	2.30	2.30	2.30	2.29	2.29	2.29	2.28	2.28	2.28	2.27	2.27
7,200	2.41	2.41	2.40	2.40	2.40	2.39	2.39	2.39	2.38	2.38	2.38	2.37	2.37	2.37	2.36	2.36	2.36	2.35	2.35	2.35	2.35	2.34	2.34	2.34
7,400	2.48	2.47	2.47	2.47	2.46	2.46	2.46	2.45	2.45	2.45	2.44	2.44	2.44	2.43	2.43	2.43	2.42	2.42	2.42	2.41	2.41	2.41	2.40	2.40
7,600	2.54	2.54	2.54	2.53	2.53	2.53	2.52	2.52	2.52	2.51	2.51	2.51	2.50	2.50	2.50	2.49	2.49	2.49	2.48	2.48	2.48	2.47	2.47	2.47
7,800	2.61	2.61	2.60	2.60	2.60	2.59	2.59	2.59	2.58	2.58	2.57	2.57	2.57	2.56	2.56	2.56	2.55	2.55	2.55	2.54	2.54	2.54	2.53	2.53
8,000	2.68	2.67	2.67	2.67	2.66	2.66	2.66	2.65	2.65	2.64	2.64	2.64	2.63	2.63	2.63	2.62	2.62	2.62	2.61	2.61	2.61	2.60	2.60	2.60
8,200	2.74	2.74	2.74	2.73	2.73	2.73	2.72	2.72	2.71	2.71	2.71	2.70	2.70	2.70	2.69	2.69	2.69	2.68	2.68	2.67	2.67	2.67	2.66	2.66
8,400	2.81	2.81	2.80	2.80	2.80	2.79	2.79	2.78	2.78	2.78	2.77	2.77	2.77	2.76	2.76	2.75	2.75	2.75	2.74	2.74	2.74	2.73	2.73	2.73
8,600	2.87	2.87	2.87	2.87	2.86	2.86	2.85	2.85	2.85	2.84	2.84	2.84	2.83	2.83	2.82	2.82	2.82	2.81	2.81	2.80	2.80	2.80	2.79	2.79
8,800	2.94	2.94	2.94	2.93	2.93	2.93	2.92	2.92	2.91	2.91	2.91	2.90	2.90	2.89	2.89	2.89	2.88	2.88	2.87	2.87	2.87	2.86	2.86	2.86
9,000	3.00	3.00	3.01	3.00	3.00	2.99	2.99	2.98	2.98	2.98	2.97	2.97	2.96	2.96	2.96	2.95	2.95	2.94	2.94	2.94	2.93	2.93	2.92	2.92
9,200	3.06	3.06	3.06	3.06	3.06	3.05	3.05	3.05	3.05	3.04	3.04	3.03	3.03	3.02	3.02	3.02	3.01	3.01	3.00	3.00	3.00	2.99	2.99	2.99
9,400	3.11	3.11	3.12	3.11	3.11	3.12	3.12	3.12	3.11	3.11	3.10	3.10	3.09	3.09	3.09	3.08	3.08	3.07	3.07	3.07	3.06	3.06	3.05	3.05
9,600	3.17	3.17	3.17	3.17	3.17	3.18	3.18	3.18	3.18	3.17	3.17	3.16	3.16	3.16	3.15	3.15	3.14	3.14	3.14	3.13	3.13	3.12	3.12	3.11
9,800	3.23	3.23	3.23	3.23	3.23	3.23	3.24	3.24	3.24	3.24	3.23	3.23	3.23	3.22	3.22	3.21	3.21	3.20	3.20	3.20	3.19	3.19	3.18	3.18
10,000	3.28	3.28	3.28	3.29	3.29	3.29	3.29	3.30	3.29	3.29	3.29	3.29	3.30	3.29	3.28	3.28	3.27	3.27	3.27	3.26	3.26	3.25	3.25	3.24
10,200	3.34	3.34	3.34	3.34	3.34	3.35	3.35	3.35	3.35	3.35	3.36	3.36	3.36	3.35	3.35	3.34	3.34	3.34	3.33	3.33	3.32	3.32	3.31	3.31
10,400	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.41	3.41	3.41	3.42	3.42	3.42	3.42	3.41	3.41	3.41	3.40	3.40	3.39	3.39	3.38	3.38	3.37
10,600	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.47	3.47	3.47	3.48	3.47	3.47	3.47	3.47	3.47	3.46	3.46	3.45	3.45	3.44	3.44
10,800	3.53	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.53	3.53	3.53	3.53	3.53	3.54	3.54	3.53	3.53	3.52	3.52	3.51	3.51	3.50
11,000	3.59	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.59	3.59	3.59	3.60	3.61	3.60	3.59	3.59	3.58	3.58	3.57	3.57
11,200	3.65	3.65	3.64	3.64	3.64	3.64	3.63	3.63	3.63	3.64	3.64	3.64	3.64	3.65	3.65	3.65	3.66	3.66	3.65	3.65	3.65	3.64	3.64	3.63
11,400	3.71	3.71	3.70	3.70	3.70	3.70	3.69	3.69	3.69	3.69	3.69	3.70	3.70	3.70	3.71	3.71	3.71	3.71	3.71	3.72	3.72	3.71	3.70	3.70
11,600	3.78	3.77	3.77	3.76	3.76	3.76	3.75	3.75	3.75	3.75	3.75	3.75	3.76	3.76	3.76	3.76	3.77	3.77	3.77	3.78	3.79	3.77	3.77	3.76
11,800	3.84	3.84	3.83	3.82	3.82	3.82	3.81	3.81	3.81	3.81	3.81	3.81	3.81	3.81	3.82	3.82	3.82	3.83	3.83	3.84	3.84	3.83	3.83	3.83
12,000	3.91	3.90	3.89	3.89	3.88	3.88	3.88	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.88	3.88	3.88	3.89	3.89	3.90	3.89	3.89	3.90
12,200	3.97	3.96	3.96	3.95	3.95	3.94	3.94	3.93	3.93	3.93	3.93	3.93	3.93	3.93	3.93	3.93	3.93	3.94	3.94	3.95	3.95	3.95	3.96	3.96
12,400	4.04	4.03	4.02	4.02	4.01	4.00	4.00	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	4.00	4.00	4.00	4.01	4.02	4.02
12,600	4.11	4.10	4.09	4.08	4.07	4.07	4.06	4.06	4.05	4.05	4.05	4.05	4.04	4.04	4.04	4.05	4.05	4.05	4.05	4.06	4.06	4.06	4.07	4.08
12,800	4.17	4.16	4.15	4.15	4.14	4.13	4.12	4.12	4.11	4.11	4.11	4.11	4.10	4.10	4.10	4.10	4.10	4.11	4.11	4.11	4.11	4.12	4.12	4.13
13,000	4.24	4.23	4.22	4.21	4.20	4.19	4.19	4.18	4.18	4.17	4.17	4.17	4.16	4.16	4.16	4.16	4.16	4.16	4.16	4.17	4.17	4.17	4.18	4.18
13,200	4.31	4.30	4.29	4.28	4.27	4.26	4.25	4.24	4.24	4.23	4.23	4.23	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.23	4.23	4.23	4.24
13,400	4.38	4.37	4.36	4.34	4.33	4.32	4.32	4.31	4.30	4.30	4.29	4.29	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.28	4.29	4.29
13,600	4.45	4.44	4.42	4.41	4.40	4.39	4.38	4.37	4.37	4.36	4.35	4.35	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.35
13,800	4.52	4.51	4.49	4.48	4.47	4.46	4.45	4.44	4.43	4.42	4.42	4.41	4.41	4.40	4.40	4.40	4.39	4.39	4.39	4.39	4.39	4.40	4.40	4.40
14,000	4.59	4.58	4.56	4.55	4.54	4.52	4.51	4.50	4.49	4.49	4.48	4.47	4.47	4.46	4.46	4.46	4.45	4.45	4.45	4.45	4.45	4.45	4.46	4.46
14,200	4.67	4.65	4.63	4.62	4.60	4.59	4.58	4.57	4.56	4.55	4.54	4.54	4.53	4.52	4.52	4.52	4.51	4.51	4.51	4.51	4.51	4.51	4.51	4.51
14,400	4.74	4.72	4.70	4.69	4.67	4.66	4.65	4.63	4.62	4.61	4.61	4.60	4.59	4.59	4.58	4.58	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57
14,600	4.81	4.79	4.77	4.76	4.74	4.73	4.71	4.70	4.69	4.68	4.67	4.66	4.65	4.65	4.64	4.64	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63
14,800	4.89	4.87	4.85	4.83	4.81	4.80	4.78	4.77	4.76	4.74	4.73	4.73	4.72	4.71	4.70	4.70	4.69	4.69	4.69	4.69	4.68	4.68	4.68	4.68
15,000	4.96	4.94	4.92	4.90	4.88	4.87	4.85	4.84	4.82	4.81	4.80	4.79	4.78	4.77	4.77	4.76	4.75	4.75	4.75	4.74	4.74	4.74	4.74	4.74
15,200	5.04	5.01	4.99	4.97	4.95	4.94	4.92	4.90	4.89	4.88	4.87	4.85	4.85	4.84	4.83	4.82	4.82	4.81	4.81	4.80	4.80	4.80	4.80	4.80
15,400	5.11	5.09	5.07	5.04	5.02	5.01	4.99	4.97	4.96	4.94	4.93	4.92	4.91	4.90	4.89	4.88	4.88	4.87	4.87	4.86	4.86	4.86	4.86	4.86
15,600	5.19	5.16	5.14	5.12	5.10	5.08	5.06	5.04	5.03	5.01	5.00	4.99	4.98	4.97	4.96	4.95	4.94	4.93	4.93	4.92	4.92	4.92	4.92	4.91
15,800	5.27	5.24	5.22	5.19	5.17	5.15	5.13	5.11	5.10	5.08	5.07	5.05	5.04	5.03	5.02	5.01	5.00	5.00	4.99	4.98	4.98	4.98	4.97	4.97
16,000	5.35	5.32	5.29	5.27	5.24	5.22	5.20	5.18	5.16	5.15	5.13	5.12	5.11	5.09	5.08	5.07	5.07	5.06	5.05	5.05	5.04	5.04	5.03	5.03
16,200	5.43	5.40	5.37	5.34	5.32	5.29	5.27	5.25	5.23	5.22	5.20	5.19	5.17	5.16	5.15	5.14	5.13	5.12	5.11	5.11	5.10	5.10	5.09	5.09
16,400	5.51	5.47	5.45	5.42	5.39	5.37	5.35	5.32	5.30	5.29	5.27	5.25	5.24	5.23	5.21	5.20	5.19	5.18	5.17	5.17	5.16	5.16	5.15	5.15
16,600	5.59	5.55	5.52	5.49	5.47	5.44	5.42	5.40	5.38	5.36	5.34	5.32	5.31	5.29	5.28	5.27	5.26	5.25	5.24	5.23	5.22	5.22	5.21	5.21
16,800	5.67	5.63	5.60	5.57	5.54	5.52	5.49	5.47	5.45	5.43	5.41	5.39	5.37	5.36	5.35	5.33	5.32	5.31	5.30	5.29	5.28	5.28	5.27	5.27
17,000	5.75	5.71	5.68	5.65	5.62	5.59	5.57	5.54	5.52	5.50	5.48	5.46	5.44	5.43	5.41	5.40	5.39	5.37	5.36	5.35	5.35	5.34	5.33	5.33
17,200	5.83	5.79	5.76	5.73	5.70	5.67	5.64	5.61	5.59	5.57	5.55	5.53	5.51	5.49	5.48	5.46	5.45	5.44	5.43	5.42	5.41	5.40	5.39	5.39
17,400	5.91	5.88	5.84	5.81	5.77	5.74	5.72	5.69	5.66	5.64	5.62	5.60	5.58	5.56	5.55	5.53	5.52	5.50	5.49	5.48	5.47	5.46	5.46	5.45
17,600	6.00	5.96	5.92	5.89	5.85	5.82	5.79	5.76	5.74	5.71	5.69	5.67	5.65	5.63	5.61	5.60	5.58	5.57	5.56	5.54	5.53	5.53	5.52	5.51
17,800	6.09	6.04	6.00	5.97	5.93	5.90	5.87	5.84	5.81	5.78	5.76	5.74	5.72	5.70	5.68	5.66	5.65	5.63	5.62	5.61	5.60	5.59	5.58	5.57
18,000	6.18	6.13	6.08	6.05	6.01	5.98	5.94	5.91	5.88	5.86	5.83	5.81	5.79	5.77	5.75	5.73	5.72	5.70	5.69	5.67	5.66	5.65	5.64	5.63
18,200	6.28	6.21	6.17	6.13	6.09	6.05	6.02	5.99	5.96	5.93	5.91	5.88	5.86	5.84	5.82	5.80	5.78	5.77	5.75	5.74	5.73	5.71	5.70	5.69
18,400	6.38	6.31	6.25	6.21	6.17	6.13	6.10	6.07	6.04	6.01	5.98	5.95	5.93	5.91	5.89	5.87	5.85	5.83	5.82	5.80	5.79	5.78	5.77	5.76
18,600	6.48	6.41	6.35	6.29	6.25	6.21	6.18	6.14	6.11	6.08	6.05	6.02	6.00	5.98	5.96	5.94	5.92	5.90	5.88	5.87	5.85	5.84	5.83	5.82
18,800	6.58	6.51	6.44	6.37	6.33	6.29	6.26	6.22	6.19	6.16	6.13	6.10	6.07	6.05	6.03	6.00	5.98	5.97	5.95	5.93	5.92	5.91	5.89	5.88
19,000	6.68	6.61	6.54	6.47	6.41	6.37	6.33	6.30	6.26	6.23	6.20	6.17	6.15	6.12	6.10	6.07	6.05	6.03	6.02	6.00	5.98	5.97	5.96	5.94
19,200	6.78	6.71	6.63	6.56	6.50	6.45	6.41	6.38	6.34	6.31	6.27	6.24	6.22	6.19	6.17	6.14	6.12	6.10	6.08	6.06	6.05	6.03	6.02	6.01
19,400	6.89	6.81	6.73	6.66	6.59	6.53	6.49	6.45	6.42	6.38	6.35	6.32	6.29	6.26	6.24	6.21	6.19	6.17	6.15	6.13	6.11	6.10	6.08	6.07
19,600	6.99	6.90	6.83	6.75	6.68	6.61	6.57	6.53	6.49	6.46	6.42	6.39	6.36	6.33	6.31	6.28	6.26	6.24	6.22	6.20	6.18	6.16	6.15	6.14
19,800	7.09	7.00	6.92	6.84	6.77	6.70	6.65	6.61	6.57	6.53	6.50	6.46	6.43	6.41	6.38	6.35	6.33	6.31	6.28	6.26	6.25	6.23	6.21	6.20
20,000	7.18	7.10	7.02	6.94	6.86	6.79	6.73	6.69	6.65	6.61	6.57	6.54	6.51	6.48	6.45	6.42	6.40	6.37	6.35	6.33	6.31	6.29	6.28	6.26
20,200	7.29	7.20	7.11	7.03	6.96	6.88	6.81	6.77	6.72	6.68	6.65	6.61	6.58	6.55	6.52	6.49	6.47	6.44	6.42	6.40	6.38	6.36	6.34	6.33
20,400	7.39	7.30	7.21	7.13	7.05	6.97	6.90	6.85	6.80	6.76	6.72	6.69	6.65	6.62	6.59	6.56	6.54	6.51	6.49	6.46	6.44	6.43	6.41	6.39
20,600	7.49	7.40	7.31	7.23	7.15	7.07	6.99	6.93	6.88	6.84	6.80	6.76	6.73	6.69	6.66	6.63	6.60	6.58	6.55	6.53	6.51	6.49	6.47	6.46
20,800	7.59	7.49	7.41	7.32	7.24	7.16	7.08	7.01	6.96	6.91	6.87	6.83	6.80	6.76	6.73	6.70	6.67	6.64	6.62	6.60	6.57	6.55	6.54	6.52
21,000	7.68	7.59	7.50	7.41	7.32	7.25	7.16	7.09	7.03	6.98	6.94	6.90	6.87	6.83	6.80	6.77	6.74	6.71	6.69	6.66	6.64	6.62	6.60	6.58
21,200	7.77	7.68	7.58	7.49	7.41	7.32	7.24	7.17	7.10	7.06	7.01	6.97	6.94	6.90	6.87	6.83	6.80	6.78	6.75	6.73	6.70	6.68	6.66	6.65
21,400	7.86	7.76	7.67	7.57	7.49	7.40	7.32	7.24	7.17	7.13	7.08	7.04	7.00	6.97	6.93	6.90	6.87	6.84	6.82	6.79	6.77	6.75	6.73	6.71
21,600	7.94	7.84	7.75	7.66	7.57	7.48	7.40	7.32	7.25	7.20	7.15	7.11	7.07	7.04	7.00	6.97	6.94	6.91	6.88	6.86	6.83	6.81	6.79	6.77
21,800	8.03	7.93	7.83	7.74	7.65	7.56	7.48	7.40	7.32	7.27	7.22	7.18	7.14	7.10	7.07	7.04	7.00	6.97	6.95	6.92	6.90	6.88	6.86	6.84
22,000	8.11	8.01	7.91	7.82	7.73	7.64	7.56	7.47	7.39	7.34	7.29	7.25	7.21	7.17	7.14	7.10	7.07	7.04	7.01	6.99	6.96	6.94	6.92	6.90
22,200	8.20	8.10	8.00	7.90	7.81	7.72	7.63	7.55	7.47	7.41	7.37	7.32	7.28	7.24	7.20	7.17	7.14	7.11	7.08	7.05	7.03	7.01	6.98	6.96
22,400	8.28	8.18	8.08	7.98	7.89	7.80	7.71	7.63	7.55	7.48	7.44	7.39	7.35	7.31	7.27	7.24	7.20	7.17	7.14	7.12	7.09	7.07	7.05	7.03
22,600	8.37	8.26	8.16	8.06	7.97	7.88	7.79	7.70	7.62	7.55	7.51	7.46	7.42	7.38	7.34	7.30	7.27	7.24	7.21	7.18	7.16	7.13	7.11	7.09
22,800	8.45	8.35	8.24	8.14	8.05	7.96	7.87	7.78	7.70	7.63	7.58	7.53	7.49	7.45	7.41	7.37	7.34	7.31	7.28	7.25	7.22	7.20	7.18	7.16
23,000	8.54	8.43	8.33	8.23	8.13	8.04	7.95	7.86	7.77	7.70	7.65	7.60	7.56	7.52	7.48	7.44	7.40	7.37	7.34	7.31	7.29	7.26	7.24	7.22
23,200	8.63	8.52	8.41	8.31	8.21	8.12	8.02	7.94	7.85	7.77	7.72	7.67	7.63	7.58	7.54	7.51	7.47	7.44	7.41	7.38	7.35	7.33	7.30	7.28
23,400	8.71	8.60	8.49	8.39	8.29	8.20	8.10	8.01	7.93	7.85	7.79	7.74	7.70	7.65	7.61	7.57	7.54	7.51	7.47	7.45	7.42	7.39	7.37	7.35
23,600	8.80	8.69	8.58	8.47	8.37	8.28	8.18	8.09	8.00	7.92	7.86	7.81	7.77	7.72	7.68	7.64	7.61	7.57	7.54	7.51	7.48	7.46	7.43	7.41
23,800	8.89	8.77	8.66	8.56	8.45	8.36	8.26	8.17	8.08	8.00	7.93	7.88	7.84	7.79	7.75	7.71	7.67	7.64	7.61	7.58	7.55	7.52	7.50	7.47
24,000	8.97	8.86	8.75	8.64	8.53	8.44	8.34	8.25	8.16	8.07	8.00	7.95	7.91	7.86	7.82	7.78	7.74	7.71	7.67	7.64	7.61	7.59	7.56	7.54
24,200	9.06	8.94	8.83	8.72	8.62	8.52	8.42	8.33	8.23	8.15	8.07	8.02	7.98	7.93	7.89	7.85	7.81	7.77	7.74	7.71	7.68	7.65	7.63	7.60
24,400	9.15	9.03	8.91	8.80	8.70	8.60	8.50	8.40	8.31	8.22	8.15	8.09	8.05	8.00	7.95	7.91	7.88	7.84	7.81	7.77	7.74	7.72	7.69	7.67
24,600	9.23	9.11	9.00	8.89	8.78	8.68	8.58	8.48	8.39	8.30	8.22	8.16	8.12	8.07	8.02	7.98	7.94	7.91	7.87	7.84	7.81	7.78	7.76	7.73
24,800	9.32	9.20	9.08	8.97	8.86	8.76	8.66	8.56	8.47	8.38	8.29	8.23	8.19	8.14	8.09	8.05	8.01	7.97	7.94	7.91	7.88	7.85	7.82	7.80
25,000	9.41	9.28	9.17	9.05	8.94	8.84	8.74	8.64	8.54	8.45	8.36	8.31	8.26	8.21	8.16	8.12	8.08	8.04	8.00	7.97	7.94	7.91	7.89	7.86
25,200	9.50	9.37	9.25	9.14	9.03	8.92	8.82	8.72	8.62	8.53	8.44	8.38	8.33	8.28	8.23	8.19	8.15	8.11	8.07	8.04	8.01	7.98	7.95	7.93
25,400	9.58	9.46	9.34	9.22	9.11	9.00	8.90	8.80	8.70	8.61	8.52	8.45	8.40	8.35	8.30	8.26	8.22	8.18	8.14	8.11	8.07	8.04	8.02	7.99
25,600	9.68	9.55	9.43	9.31	9.20	9.09	8.98	8.88	8.78	8.69	8.60	8.52	8.47	8.42	8.37	8.33	8.29	8.25	8.21	8.17	8.14	8.11	8.08	8.06
25,800	9.78	9.65	9.52	9.40	9.29	9.18	9.07	8.97	8.87	8.77	8.68	8.60	8.55	8.50	8.45	8.40	8.36	8.32	8.28	8.24	8.21	8.18	8.15	8.12
26,000	9.87	9.74	9.62	9.49	9.38	9.27	9.16	9.05	8.95	8.86	8.76	8.68	8.62	8.57	8.52	8.47	8.43	8.39	8.35	8.31	8.28	8.24	8.21	8.19
26,200	9.97	9.84	9.71	9.59	9.47	9.36	9.25	9.14	9.04	8.94	8.84	8.75	8.69	8.64	8.59	8.54	8.50	8.46	8.42	8.38	8.34	8.31	8.28	8.25
26,400	10.07	9.93	9.80	9.68	9.56	9.45	9.33	9.23	9.12	9.02	8.93	8.83	8.77	8.71	8.66	8.61	8.57	8.53	8.49	8.45	8.41	8.38	8.35	8.32
26,600	10.17	10.03	9.90	9.77	9.65	9.53	9.42	9.31	9.21	9.11	9.01	8.91	8.84	8.79	8.73	8.69	8.64	8.60	8.55	8.52	8.48	8.45	8.41	8.38
26,800	10.27	10.13	9.99	9.87	9.74	9.62	9.51	9.40	9.29	9.19	9.09	9.00	8.92	8.86	8.81	8.76	8.71	8.66	8.62	8.58	8.55	8.51	8.48	8.45
27,000	10.36	10.22	10.09	9.96	9.83	9.71	9.60	9.49	9.38	9.28	9.18	9.08	8.99	8.93	8.88	8.83	8.78	8.73	8.69	8.65	8.61	8.58	8.55	8.52
27,200	10.46	10.32	10.18	10.05	9.92	9.80	9.69	9.57	9.46	9.36	9.26	9.16	9.07	9.01	8.95	8.90	8.85	8.80	8.76	8.72	8.68	8.65	8.61	8.58
27,400	10.56	10.41	10.28	10.14	10.01	9.89	9.77	9.66	9.55	9.44	9.34	9.24	9.15	9.08	9.02	8.97	8.92	8.87	8.83	8.79	8.75	8.71	8.68	8.66
27,600	10.66	10.51	10.37	10.24	10.11	9.98	9.86	9.75	9.63	9.53	9.42	9.32	9.23	9.15	9.10	9.04	8.99	8.94	8.90	8.86	8.82	8.78	8.75	8.73
27,800	10.76	10.61	10.46	10.33	10.20	10.07	9.95	9.83	9.72	9.61	9.50	9.40	9.31	9.23	9.17	9.11	9.06	9.01	8.97	8.93	8.89	8.85	8.81	8.81
28,000	10.85	10.70	10.56	10.42	10.29	10.16	10.04	9.92	9.80	9.69	9.59	9.48	9.39	9.30	9.24	9.19	9.13	9.08	9.04	8.99	8.95	8.91	8.89	8.88
28,200	10.95	10.80	10.65	10.51	10.38	10.25	10.12	10.01	9.89	9.78	9.67	9.56	9.47	9.37	9.31	9.26	9.20	9.15	9.11	9.06	9.02	8.98	8.97	8.96
28,400	11.05	10.90	10.75	10.61	10.47	10.34	10.21	10.09	9.97	9.86	9.75	9.65	9.55	9.45	9.39	9.33	9.28	9.22	9.18	9.13	9.09	9.06	9.04	9.03
28,600	11.15	10.99	10.84	10.70	10.56	10.43	10.30	10.18	10.06	9.95	9.84	9.73	9.63	9.53	9.46	9.40	9.35	9.30	9.25	9.20	9.16	9.13	9.12	9.11
28,800	11.25	11.09	10.94	10.79	10.65	10.52	10.39	10.27	10.15	10.03	9.92	9.81	9.71	9.61	9.53	9.47	9.42	9.37	9.32	9.27	9.23	9.21	9.20	9.19
29,000	11.35	11.19	11.03	10.88	10.75	10.61	10.48	10.35	10.23	10.12	10.00	9.89	9.79	9.69	9.61	9.55	9.49	9.44	9.39	9.34	9.30	9.29	9.28	9.27
29,200	11.45	11.29	11.13	10.98	10.84	10.70	10.57	10.44	10.32	10.20	10.09	9.97	9.87	9.78	9.68	9.62	9.56	9.51	9.46	9.41	9.38	9.37	9.36	9.35
29,400	11.55	11.38	11.23	11.07	10.93	10.79	10.66	10.53	10.41	10.29	10.17	10.06	9.96	9.86	9.76	9.69	9.63	9.58	9.53	9.48	9.46	9.45	9.44	9.43
29,600	11.65	11.48	11.32	11.17	11.02	10.88	10.75	10.62	10.49	10.37	10.26	10.14	10.04	9.94	9.84	9.76	9.71	9.65	9.60	9.55	9.54	9.53	9.52	9.51
29,800	11.75	11.58	11.42	11.26	11.12	10.97	10.84	10.71	10.58	10.46	10.34	10.22	10.12	10.02	9.92	9.84	9.78	9.72	9.67	9.63	9.62	9.61	9.60	9.59
30,000	11.85	11.68	11.52	11.36	11.21	11.07	10.93	10.80	10.67	10.54	10.42	10.31	10.20	10.10	10.00	9.91	9.85	9.79	9.74	9.71	9.70	9.69	9.69	9.68

Table 7 Diversion Inlet Control Structure (*DICS*) Gate Opening (ft) - Part A

Flow through DICS (cfs)	Staging Area Elevation at Wild Rice River, $Z_{STAGING-AREA-WRR}$ (ft)																																			
	910.0	910.1	910.2	910.3	910.4	910.5	910.6	910.7	910.8	910.9	911.0	911.1	911.2	911.3	911.4	911.5	911.6	911.7	911.8	911.9	912.0	912.1	912.2	912.3	912.4	912.5	912.6	912.7	912.8	912.9	913.0	913.1	913.2	913.3	913.4	913.5
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.28	0.23	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.44	0.36	0.31	0.27	0.24	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.59	0.49	0.41	0.36	0.32	0.28	0.26	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.76	0.62	0.52	0.45	0.40	0.36	0.32	0.30	0.30	0.29	0.29	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25
600	0.94	0.76	0.64	0.55	0.48	0.43	0.39	0.37	0.36	0.35	0.35	0.34	0.34	0.33	0.33	0.32	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30
700	1.13	0.90	0.75	0.65	0.57	0.51	0.46	0.43	0.42	0.41	0.41	0.40	0.39	0.39	0.38	0.38	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.35
800	1.33	1.05	0.88	0.75	0.66	0.59	0.53	0.49	0.48	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40
900	1.56	1.22	1.00	0.86	0.75	0.67	0.60	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.49	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.45	0.45
1,000	1.83	1.39	1.14	0.97	0.84	0.75	0.67	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.54	0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.50
1,100	26.00	1.59	1.29	1.09	0.94	0.83	0.75	0.70	0.68	0.66	0.65	0.64	0.62	0.61	0.60	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.57	0.57	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.55
1,200	26.00	1.81	1.44	1.21	1.04	0.92	0.82	0.77	0.75	0.73	0.71	0.70	0.68	0.67	0.66	0.65	0.65	0.64	0.64	0.64	0.63	0.63	0.63	0.62	0.62	0.62	0.62	0.62	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
1,300	26.00	2.08	1.61	1.34	1.15	1.01	0.90	0.84	0.81	0.79	0.77	0.75	0.74	0.72	0.71	0.71	0.70	0.70	0.69	0.69	0.69	0.68	0.68	0.68	0.67	0.67	0.67	0.67	0.67	0.67	0.66	0.66	0.66	0.66	0.66	0.66
1,400	26.00	26.00	1.80	1.48	1.26	1.10	0.98	0.91	0.88	0.86	0.84	0.81	0.80	0.78	0.77	0.76	0.76	0.75	0.75	0.74	0.74	0.74	0.73	0.73	0.73	0.73	0.72	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.71
1,500	26.00	26.00	2.02	1.63	1.38	1.20	1.07	0.99	0.95	0.93	0.90	0.88	0.85	0.84	0.83	0.82	0.81	0.81	0.80	0.80	0.79	0.79	0.79	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.77	0.77	0.76	0.76	0.76	0.76
1,600	26.00	26.00	26.00	1.79	1.50	1.30	1.15	1.06	1.03	0.99	0.96	0.94	0.91	0.89	0.89	0.88	0.87	0.86	0.86	0.85	0.85	0.84	0.84	0.84	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.81	0.81	0.81
1,700	26.00	26.00	26.00	1.98	1.64	1.41	1.24	1.14	1.10	1.06	1.03	1.00	0.97	0.95	0.94	0.94	0.93	0.92	0.91	0.91	0.90	0.90	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.87	0.87	0.86	0.86
1,800	26.00	26.00	26.00	26.00	1.78	1.53	1.34	1.23	1.18	1.14	1.10	1.06	1.03	1.01	1.00	0.99	0.99	0.98	0.97	0.96	0.96	0.95	0.95	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.91
1,900	26.00	26.00	26.00	26.00	1.95	1.65	1.44	1.31	1.26	1.21	1.17	1.13	1.10	1.08	1.07	1.05	1.04	1.03	1.02	1.02	1.01	1.01	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.97
2,000	26.00	26.00	26.00	26.00	2.14	1.78	1.54	1.40	1.34	1.29	1.24	1.19	1.16	1.14	1.13	1.12	1.10	1.09	1.08	1.08	1.07	1.06	1.06	1.05	1.05	1.04	1.04	1.04	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02
2,100	26.00	26.00	26.00	26.00	26.00	1.93	1.66	1.50	1.43	1.37	1.31	1.27	1.23	1.21	1.19	1.18	1.16	1.15	1.14	1.13	1.13	1.12	1.11	1.11	1.10	1.10	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.07	1.07
2,200	26.00	26.00	26.00	26.00	26.00	2.09	1.77	1.60	1.52	1.45	1.39	1.34	1.30	1.28	1.26	1.24	1.22	1.21	1.20	1.19	1.18	1.17	1.17	1.16	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.13	1.13	1.13	1.12	1.12
2,300	26.00	26.00	26.00	26.00	26.00	26.00	1.91	1.71	1.62	1.54	1.48	1.41	1.37	1.35	1.32	1.30	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.22	1.21	1.21	1.20	1.20	1.20	1.19	1.19	1.19	1.18	1.18	1.18	1.17
2,400	26.00	26.00	26.00	26.00	26.00	26.00	2.05	1.83	1.73	1.64	1.56	1.50	1.45	1.42	1.39	1.37	1.35	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.27	1.26	1.26	1.26	1.25	1.25	1.24	1.24	1.24	1.23	1.23	1.23
2,500	26.00	26.00	26.00	26.00	26.00	26.00	26.00	1.96	1.85	1.75	1.66	1.58	1.53	1.50	1.46	1.43	1.41	1.40	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.32	1.32	1.31	1.31	1.30	1.30	1.30	1.29	1.29	1.28	1.28
2,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.10	1.98	1.87	1.77	1.68	1.62	1.57	1.54	1.50	1.48	1.47	1.45	1.44	1.42	1.41	1.40	1.39	1.38	1.38	1.37	1.37	1.36	1.36	1.35	1.35	1.35	1.34	1.34	1.33
2,700	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.13	2.00	1.89	1.79	1.72	1.66	1.61	1.58	1.55	1.54	1.52	1.50	1.49	1.47	1.46	1.45	1.44	1.44	1.43	1.42	1.42	1.41	1.41	1.41	1.40	1.39	1.39	1.38
2,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.16	2.03	1.91	1.82	1.76	1.70	1.66	1.63	1.61	1.59	1.57	1.55	1.54	1.52	1.51	1.50	1.50	1.49	1.48	1.48	1.47	1.47	1.46	1.46	1.45	1.44	1.44
2,900	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.20	2.06	1.95	1.87	1.79	1.75	1.72	1.69	1.66	1.64	1.62	1.60	1.59	1.57	1.57	1.56	1.55	1.54	1.54	1.53	1.52	1.52	1.51	1.51	1.50	1.49
3,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.25	2.11	1.99	1.91	1.85	1.80	1.77	1.74	1.72	1.70	1.68	1.66	1.64	1.63	1.62	1.61	1.60	1.60	1.59	1.58	1.58	1.57	1.56	1.55	1.55
3,100	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.52	2.33	2.16	2.04	1.97	1.91	1.86	1.82	1.79	1.77	1.75	1.73	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.62	1.61	1.60
3,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.41	2.23	2.12	2.03	1.97	1.93	1.89	1.86	1.83	1.80	1.79	1.77	1.76	1.75	1.74	1.73	1.71	1.70	1.69	1.68	1.67	1.66	1.66
3,300	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.52	2.33	2.19	2.10	2.04	1.99	1.95	1.92	1.89	1.87	1.85	1.84	1.82	1.80	1.79	1.78	1.77	1.75	1.74	1.73	1.72	1.71
3,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.67	2.45	2.29	2.19	2.13	2.07	2.02	1.99	1.96	1.94	1.92	1.90	1.88	1.86	1.85	1.83	1.82	1.80	1.79	1.78	1.77
3,500	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.59	2.41	2.30	2.20	2.14	2.10	2.07	2.03	2.00	1.98	1.96	1.94	1.92	1.91	1.89	1.87	1.85	1.84	1.82
3,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.72	2.55	2.40	2.30	2.24	2.18	2.15	2.11	2.08	2.05	2.02	2.00	1.98	1.96	1.94	1.92	1.90	1.88
3,700	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.85	2.68	2.52	2.41	2.34	2.28	2.22	2.18	2.15	2.12	2.09	2.06	2.03	2.00	1.98	1.96	1.94
3,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.95	2.80	2.65	2.53	2.44	2.37	2.31	2.26	2.21	2.18	2.15	2.11	2.08	2.05	2.02	2.00
3,900	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.89	2.77	2.64	2.54	2.46	2.39	2.34	2.29	2.25	2.19	2.15	2.12	2.09	2.06
4,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	2.96	2.85	2.74	2.63	2.55	2.47	2.41	2.36	2.29	2.23	2.19	2.16	2.12
4,100	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.09	2.93	2.83	2.72	2.63	2.55	2.48	2.39	2.32	2.27	2.22	2.19
4,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.47	3.20	3.00	2.90	2.80	2.71	2.63	2.50	2.41	2.35	2.29	2.25
4,300	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.48	3.26	3.09	2.97	2.87	2.78	2.62	2.51	2.43	2.37	2.32
4,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.49	3.30	3.15	3.03	2.94	2.75	2.61	2.51	2.44	2.38
4,500	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.49	3.33	3.20	3.09	2.88	2.72	2.60	2.52	2.45
4,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.49	3.35	3.24	3.02	2.83	2.70	2.60	2.52
4,700	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.50	3.36	3.15	2.95	2.80	2.68	2.59
4,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.50	3.28	3.07	2.90	2.77	2.67
4,900	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.40	3.20	3.01	2.86	2.75
5,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.53	3.31	3.12	2.96	2.83
5,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	3.55	3.34	3.16	3.00
5,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	4.13	3.57	3.36	3.19
5,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	4.00	3.59	3.39
5,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	4.47	3.93	3.60
6,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	4.30	3.89
6,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	4.19
6,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	4.47
6,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
6,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
7,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
7,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
7,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
7,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
7,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
8,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
8,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
8,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
8,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
8,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
9,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
9,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
9,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
9,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
9,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
10,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
10,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
10,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
10,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
10,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
11,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
11,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
11,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
11,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
11,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
12,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
12,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
12,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
12,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
12,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
13,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
13,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
13,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
13,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
13,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
14,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
14,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
14,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
14,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
14,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
15,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
15,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
15,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
15,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
15,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
16,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
16,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
16,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
16,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
16,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
17,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
17,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
17,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
17,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
17,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
18,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
18,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
18,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
18,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
18,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
19,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
19,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
19,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
19,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
19,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
20,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
20,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
20,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
20,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
20,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
21,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
21,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
21,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
21,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
21,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
22,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
22,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
22,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
22,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
22,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
30,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00

Table 7 Diversion Inlet Control Structure (DICS) Gate Opening (ft) - Part B

Flow through DICS (cfs)	Staging Area Elevation at Wild Rice River, $Z_{STAGING-AREA-WRR}$ (ft)																																	
	913.6	913.7	913.8	913.9	914	914.1	914.2	914.3	914.4	914.5	914.6	914.7	914.8	914.9	915	915.1	915.2	915.3	915.4	915.5	915.6	915.7	915.8	915.9	916	916.1	916.2	916.3	916.4	916.5	916.6	916.7	916.8	916.9
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
600	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
700	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
800	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.37	0.37	0.37	0.37	0.37
900	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
1,000	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.46
1,100	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.51	0.51	0.51	0.51
1,200	0.60	0.60	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.56	0.56	0.56
1,300	0.66	0.65	0.65	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.64	0.64	0.63	0.63	0.63	0.63	0.63	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.60
1,400	0.71	0.70	0.70	0.70	0.70	0.70	0.69	0.69	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.67	0.67	0.67	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.65	0.65	0.65	0.65
1,500	0.76	0.76	0.75	0.75	0.75	0.75	0.74	0.74	0.74	0.74	0.74	0.73	0.73	0.73	0.73	0.73	0.72	0.72	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.71	0.71	0.70	0.70	0.70	0.70	0.70	0.70
1,600	0.81	0.81	0.80	0.80	0.80	0.80	0.79	0.79	0.79	0.79	0.79	0.78	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.77	0.76	0.76	0.76	0.76	0.76	0.76	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.74
1,700	0.86	0.86	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.80	0.80	0.80	0.80	0.80	0.80	0.79	0.79	0.79
1,800	0.91	0.91	0.91	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.84
1,900	0.96	0.96	0.96	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.88
2,000	1.01	1.01	1.01	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
2,100	1.07	1.06	1.06	1.06	1.05	1.05	1.05	1.04	1.04	1.04	1.03	1.03	1.03	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98
2,200	1.12	1.11	1.11	1.11	1.10	1.10	1.10	1.09	1.09	1.08	1.08	1.08	1.07	1.07	1.07	1.07	1.06	1.06	1.06	1.05	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.02
2,300	1.17	1.17	1.16	1.16	1.15	1.15	1.15	1.14	1.14	1.13	1.13	1.13	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.07	1.07	1.07
2,400	1.22	1.22	1.21	1.21	1.20	1.20	1.20	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12
2,500	1.27	1.27	1.26	1.26	1.26	1.25	1.25	1.24	1.24	1.23	1.23	1.22	1.22	1.22	1.21	1.21	1.21	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.18	1.18	1.18	1.18	1.17	1.17	1.17	1.17	1.16
2,600	1.33	1.32	1.32	1.31	1.31	1.30	1.30	1.29	1.29	1.28	1.28	1.27	1.27	1.27	1.26	1.26	1.26	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.21	1.21	1.21
2,700	1.38	1.37	1.37	1.36	1.36	1.35	1.35	1.34	1.34	1.33	1.33	1.32	1.32	1.32	1.31	1.31	1.30	1.30	1.30	1.29	1.29	1.29	1.29	1.28	1.28	1.28	1.27	1.27	1.27	1.27	1.26	1.26	1.26	1.26
2,800	1.43	1.43	1.42	1.41	1.41	1.40	1.40	1.39	1.39	1.38	1.38	1.37	1.37	1.36	1.36	1.36	1.35	1.35	1.35	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.32	1.32	1.32	1.31	1.31	1.31	1.31	1.30
2,900	1.49	1.48	1.47	1.47	1.46	1.45	1.45	1.44	1.44	1.43	1.43	1.42	1.42	1.41	1.41	1.41	1.40	1.40	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.37	1.37	1.37	1.36	1.36	1.36	1.35	1.35	1.35
3,000	1.54	1.53	1.52	1.52	1.51	1.51	1.50	1.49	1.49	1.48	1.48	1.47	1.47	1.46	1.46	1.45	1.45	1.45	1.44	1.44	1.44	1.43	1.43	1.43	1.42	1.42	1.42	1.41	1.41	1.41	1.40	1.40	1.40	1.40
3,100	1.59	1.58	1.58	1.57	1.56	1.56	1.55	1.54	1.54	1.53	1.53	1.52	1.52	1.51	1.51	1.50	1.50	1.49	1.49	1.49	1.48	1.48	1.48	1.47	1.47	1.47	1.46	1.46	1.46	1.45	1.45	1.45	1.45	1.44
3,200	1.65	1.64	1.63	1.62	1.62	1.61	1.60	1.59	1.59	1.58	1.58	1.57	1.57	1.56	1.56	1.55	1.55	1.54	1.54	1.54	1.53	1.53	1.52	1.52	1.52	1.51	1.51	1.51	1.50	1.50	1.50	1.50	1.49	1.49
3,300	1.70	1.69	1.68	1.67	1.67	1.66	1.65	1.65	1.64	1.63	1.63	1.62	1.62	1.61	1.60	1.60	1.60	1.59	1.59	1.58	1.58	1.58	1.57	1.57	1.57	1.56	1.56	1.56	1.55	1.55	1.55	1.54	1.54	1.54
3,400	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.70	1.69	1.68	1.68	1.67	1.66	1.66	1.65	1.65	1.64	1.64	1.64	1.63	1.63	1.62	1.62	1.62	1.61	1.61	1.61	1.60	1.60	1.60	1.59	1.59	1.59	1.58
3,500	1.81	1.80	1.79	1.78	1.77	1.76	1.76	1.75	1.74	1.73	1.73	1.72	1.71	1.71	1.70	1.70	1.69	1.69	1.68	1.68	1.68	1.67	1.67	1.66	1.66	1.66	1.65	1.65	1.65	1.64	1.64	1.64	1.63	1.63
3,600	1.87	1.85	1.84	1.83	1.82	1.81	1.81	1.80	1.79	1.78	1.78	1.77	1.76	1.76	1.75	1.75	1.74	1.74	1.73	1.73	1.72	1.72	1.72	1.71	1.71	1.70	1.70	1.70	1.69	1.69	1.69	1.68	1.68	1.68
3,700	1.93	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.83	1.82	1.81	1.81	1.80	1.79	1.79	1.78	1.78	1.78	1.77	1.77	1.76	1.76	1.76	1.75	1.75	1.74	1.74	1.74	1.73	1.73	1.73	1.72
3,800	1.98	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.88	1.87	1.86	1.86	1.85	1.84	1.84	1.83	1.83	1.82	1.82	1.82	1.81	1.81	1.80	1.80	1.80	1.79	1.79	1.78	1.78	1.78	1.77	1.77
3,900	2.04	2.02	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.93	1.92	1.91	1.90	1.90	1.89	1.89	1.88	1.88	1.87	1.87	1.86	1.86	1.86	1.85	1.85	1.84	1.84	1.83	1.83	1.83	1.82	1.82	1.82
4,000	2.10	2.07	2.06	2.05	2.03	2.02	2.01	2.00	1.99	1.98	1.98	1.97	1.96	1.95	1.95	1.94	1.94	1.93	1.93	1.92	1.92	1.91	1.91	1.90	1.90	1.89	1.89	1.89	1.88	1.88	1.87	1.87	1.87	1.86
4,100	2.16	2.13	2.11	2.10	2.09	2.08	2.06	2.05	2.04	2.03	2.03	2.02	2.01	2.00	2.00	1.99	1.98	1.98	1.97	1.97	1.96	1.96	1.96	1.95	1.95	1.94	1.94	1.93	1.93	1.92	1.92	1.92	1.91	1.91
4,200	2.22	2.19	2.17	2.16	2.14	2.13	2.11	2.10	2.09	2.08	2.08	2.07	2.06	2.05	2.05	2.04	2.03	2.03	2.02	2.02	2.01	2.01	2.00	2.00	1.99	1.99	1.99	1.98	1.98	1.97	1.97	1.96	1.96	1.95
4,300	2.28	2.24	2.23	2.21	2.19	2.18	2.17	2.15	2.14	2.13	2.13	2.12	2.11	2.10	2.09	2.09	2.08	2.08	2.07	2.07	2.06	2.06	2.05	2.05	2.04	2.04	2.03	2.03	2.02	2.02	2.01	2.01	2.01	2.00
4,400	2.34	2.30	2.28	2.27	2.25	2.23	2.22	2.21	2.20	2.19	2.18	2.17	2.16	2.15	2.14	2.14	2.13	2.12	2.12	2.11	2.11	2.10	2.10	2.09	2.09	2.08	2.08	2.08	2.07	2.07	2.06	2.06	2.05	2.05
4,500	2.40	2.36	2.34	2.32	2.30	2.28	2.27	2.26	2.25	2.24	2.23	2.22	2.21	2.20	2.19	2.19	2.18	2.17	2.17	2.16	2.16	2.15	2.15	2.14	2.14	2.13	2.13	2.12	2.12	2.11	2.11	2.10	2.10	2.09
4,600	2.46	2.42	2.40	2.38	2.36	2.34	2.32	2.31	2.30	2.29	2.28	2.27	2.26	2.25	2.24	2.23	2.23	2.22	2.22	2.21	2.21	2.20	2.20	2.19	2.19	2.18	2.18	2.17	2.17	2.16	2.16	2.15	2.15	2.14
4,700	2.53	2.48	2.46	2.43	2.41	2.39	2.37	2.36	2.35	2.34	2.33	2.32	2.31	2.30	2.29	2.28	2.28	2.27	2.27	2.26	2.25	2.25	2.24	2.24	2.23	2.23	2.22	2.22	2.21	2.21	2.20	2.20	2.19	2.19
4,800	2.59	2.54	2.52	2.49	2.47	2.44	2.42	2.41	2.40	2.39	2.38	2.37	2.36	2.35	2.34	2.33	2.33	2.32	2.31	2.31	2.30	2.30	2.29	2.29	2.28	2.28	2.27	2.26	2.26	2.25	2.25	2.24	2.24	2.23
4,900	2.66	2.61	2.57	2.55	2.52	2.50	2.48	2.46	2.45	2.44	2.43	2.42	2.41	2.40	2.39	2.38	2.37	2.37	2.36	2.36	2.35	2.34	2.34	2.33	2.33	2.32	2.32	2.31	2.31	2.30	2.30	2.29	2.29	2.28
5,000	2.73	2.67	2.64	2.60	2.57	2.55	2.53	2.52	2.50	2.49	2.48	2.47	2.46	2.45	2.44	2.43	2.42	2.42	2.41	2.40	2.40	2.39	2.39	2.38	2.38	2.37	2.37	2.36	2.35	2.35	2.34	2.34	2.33	2.33
5,200	2.88	2.80	2.76	2.72	2.68	2.65	2.64	2.62	2.61	2.59	2.58	2.57	2.56	2.55	2.54	2.53	2.52	2.51	2.51	2.50	2.50	2.49	2.48	2.48	2.47	2.47	2.46	2.45	2.45	2.44	2.44	2.43	2.43	2.42
5,400	3.04	2.95	2.89	2.84	2.79	2.76	2.74	2.73	2.71	2.69	2.68	2.67	2.66	2.64	2.64	2.63	2.62	2.61	2.61	2.60	2.59	2.59	2.58	2.57	2.57	2.56	2.56	2.55	2.54	2.54	2.53	2.53	2.52	2.52
5,600	3.22	3.10	3.02	2.96	2.91	2.87	2.85	2.83	2.81	2.80	2.78	2.77	2.76	2.74	2.74	2.73	2.72	2.71	2.70	2.70	2.69	2.68	2.68	2.67	2.66	2.66	2.65	2.64	2.64	2.63	2.63	2.62	2.61	2.61
5,800	3.41	3.26	3.16	3.08	3.02	2.98	2.96	2.94	2.92	2.90	2.88	2.87	2.86	2.84	2.83	2.82	2.82	2.81	2.80	2.79	2.79	2.78	2.77	2.77	2.76	2.75	2.75	2.74	2.73	2.73	2.72	2.71	2.71	2.70
6,000	3.62	3.43	3.30	3.20	3.13	3.09	3.07	3.04	3.02	3.00	2.99	2.97	2.96	2.94	2.93	2.92	2.92	2.91	2.90	2.89	2.88	2.88	2.87	2.86	2.85	2.85	2.84	2.83	2.83	2.82	2.81	2.81	2.80	2.80
6,200	3.86	3.61	3.45	3.33	3.24	3.21	3.18	3.15	3.12	3.11	3.09	3.07	3.06	3.05	3.03	3.02	3.01	3.01	3.00	2.99	2.98	2.97	2.96	2.96	2.95	2.94	2.94	2.93	2.92	2.92	2.91	2.90	2.90	2.89
6,400	4.11	3.81	3.60	3.46	3.36	3.32	3.29	3.26	3.23	3.21	3.19	3.17	3.16	3.15	3.13	3.12	3.11	3.10	3.09	3.09	3.08	3.07	3.06	3.05	3.05	3.04	3.03	3.02	3.02	3.01	3.00	3.00	2.99	2.98
6,600	4.36	4.02	3.77	3.59	3.48	3.44	3.40	3.36	3.34	3.32	3.29	3.28	3.26	3.25	3.23	3.22	3.21	3.20	3.19	3.18	3.17	3.17	3.16	3.15	3.14	3.13	3.13	3.12	3.11	3.10	3.10	3.09	3.08	3.08
6,800	4.58	4.25	3.94	3.73	3.61	3.56	3.51	3.47	3.45	3.42	3.40	3.38	3.36	3.35	3.34	3.32	3.31	3.30	3.29	3.28	3.27	3.26	3.25	3.25	3.24	3.23	3.22	3.21	3.21	3.20	3.19	3.18	3.18	3.17
7,000	26.00	4.47	4.13	3.88	3.74	3.68	3.63	3.58	3.55	3.53	3.50	3.48	3.47	3.45	3.44	3.42	3.41	3.40	3.39	3.38	3.37	3.36	3.35	3.34	3.33	3.33	3.32	3.31	3.30	3.29	3.29	3.28	3.27	3.26
7,200	26.00	4.74	4.34	4.04	3.88	3.80	3.74	3.70	3.66	3.63	3.61	3.59	3.57	3.55	3.54	3.53	3.51	3.50	3.49	3.48	3.47	3.46	3.45	3.44	3.43	3.42	3.41	3.40	3.40	3.39	3.38	3.37	3.36	3.36
7,400	26.00	26.00	4.56	4.23	4.03	3.93	3.86	3.81	3.77	3.74	3.71	3.69	3.67	3.66	3.64	3.63	3.61	3.60	3.59	3.58	3.56	3.55	3.54	3.54	3.53	3.52	3.51	3.50	3.49	3.48	3.47	3.47	3.46	3.45
7,600	26.00	26.00	4.91	4.43	4.19	4.06	3.97	3.92	3.88	3.85	3.82	3.80	3.78	3.76	3.74	3.73	3.71	3.70	3.69	3.67	3.66	3.65	3.64	3.63	3.62	3.61	3.60	3.60	3.59	3.58	3.57	3.56	3.55	3.54
7,800	26.00	26.00	26.00	4.68	4.36	4.20	4.10	4.04	3.99	3.96	3.93	3.91	3.88	3.86	3.85	3.83	3.81	3.80	3.79	3.77	3.76	3.75	3.74	3.73	3.72	3.71	3.70	3.69	3.68	3.67	3.66	3.65	3.65	3.64
8,000	26.00	26.00	26.00	5.00	4.56	4.34	4.23	4.16	4.11	4.07	4.04	4.01	3.99	3.97	3.95	3.93	3.92	3.90	3.88	3.87	3.86	3.85	3.84	3.83	3.82	3.81	3.80	3.79	3.78	3.77	3.76	3.75	3.74	3.73
8,200	26.00	26.00	26.00	5.30	4.78	4.49	4.36	4.28	4.22	4.18	4.15	4.12	4.10	4.08	4.05	4.03	4.02	4.00	3.98	3.97	3.96	3.94	3.93	3.92	3.91	3.90	3.89	3.88	3.87	3.86	3.85	3.84	3.83	3.83
8,400	26.00	26.00	26.00	26.00	5.04	4.65	4.50	4.40	4.34	4.29	4.26	4.23	4.20	4.18	4.16	4.14	4.12	4.10	4.08	4.07	4.05	4.04	4.03	4.02	4.01	4.00	3.99	3.98	3.97	3.96	3.95	3.94	3.93	3.92
8,600	26.00	26.00	26.00	26.00	5.32	4.84	4.64	4.53	4.46	4.41	4.37	4.34	4.31	4.29	4.26	4.24	4.22	4.20	4.18	4.17	4.15	4.14	4.13	4.12	4.10	4.09	4.08	4.07	4.06	4.05	4.04	4.03	4.02	4.01
8,800	26.00	26.00	26.00	26.00	26.00	5.08	4.79	4.66	4.58	4.53	4.49	4.45	4.42	4.39	4.37	4.35	4.32	4.30	4.29	4.27	4.25	4.24	4.23	4.21	4.20	4.19	4.18	4.17	4.16	4.15	4.14	4.13	4.12	4.11
9,000	26.00	26.00	26.00	26.00	26.00	5.40	4.96	4.80	4.71	4.65	4.60	4.56	4.53	4.50	4.48	4.45	4.43	4.41	4.39	4.37	4.35	4.34	4.32	4.31	4.30	4.29	4.28	4.26	4.25	4.24	4.23	4.22	4.21	4.20
9,200	26.00	26.00	26.00	26.00	26.00	5.74	5.15	4.95	4.84	4.77	4.72	4.68	4.64	4.61	4.58	4.56	4.53	4.51	4.49	4.47	4.45	4.43	4.42	4.41	4.39	4.38	4.37	4.36	4.35	4.34	4.33	4.32	4.31	4.29
9,400	26.00	26.00	26.00	26.00	26.00	26.00	5.39	5.11	4.99	4.90	4.84	4.79	4.76	4.72	4.69	4.66	4.64	4.61	4.59	4.57	4.55	4.53	4.52	4.50	4.49	4.48	4.47	4.46	4.44	4.43	4.42	4.41	4.40	4.39
9,600	26.00	26.00	26.00	26.00	26.00	26.00	5.77	5.29	5.14	5.04	4.97	4.91	4.87	4.83	4.80	4.77	4.74	4.72	4.69	4.67	4.65	4.63	4.62	4.60	4.59	4.58	4.56	4.55	4.54	4.53	4.52	4.51	4.49	4.48
9,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	5.51	5.31	5.18	5.09	5.03	4.98	4.94	4.91	4.88	4.85	4.82	4.79	4.77	4.75	4.73	4.71	4.70	4.69	4.67	4.66	4.65	4.64	4.62	4.61	4.60	4.59	4.58
10,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	5.88	5.50	5.33	5.22	5.15	5.10	5.06	5.02	4.99	4.95	4.92	4.90	4.87	4.85	4.83	4.81	4.80	4.78	4.77	4.76	4.74	4.73	4.72	4.71	4.70	4.68	4.67
10,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	5.75	5.50	5.36	5.28	5.22	5.17	5.13	5.09	5.06	5.03	5.00	4.97	4.95	4.93	4.91	4.90	4.88	4.87	4.85	4.84	4.83	4.82	4.80	4.79	4.78	4.77
10,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.22	5.69	5.51	5.41	5.34	5.29	5.24	5.20	5.17	5.14	5.11	5.08	5.05	5.03	5.01	5.00	4.98	4.97	4.95	4.94	4.92	4.91	4.90	4.89	4.87	4.86
10,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	5.93	5.66	5.54	5.46	5.40	5.36	5.32	5.28	5.24	5.21	5.18	5.15	5.13	5.11	5.09	5.08	5.06	5.05	5.03	5.02	5.01	4.99	4.98	4.97	4.96
10,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.34	5.83	5.68	5.59	5.52	5.48	5.43	5.39	5.36	5.32	5.29	5.26	5.23	5.21	5.19	5.18	5.16	5.15	5.13	5.12	5.10	5.09	5.08	5.06	5.05
11,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.03	5.82	5.72	5.65	5.60	5.55	5.51	5.47	5.43	5.40	5.36	5.34	5.31	5.29	5.28	5.26	5.24	5.23	5.21	5.20	5.19	5.17	5.16	5.14
11,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.33	6.00	5.87	5.78	5.72	5.67	5.62	5.58	5.54	5.51	5.47	5.44	5.41	5.40	5.37	5.36	5.34	5.33	5.31	5.30	5.28	5.27	5.25	5.24
11,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.23	6.03	5.93	5.85	5.79	5.74	5.70	5.66	5.61	5.58	5.54	5.52	5.49	5.47	5.46	5.44	5.42	5.41	5.39	5.38	5.36	5.35	5.33
11,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.58	6.21	6.07	5.99	5.92	5.87	5.82	5.77	5.72	5.68	5.65	5.62	5.59	5.57	5.55	5.54	5.52	5.50	5.49	5.47	5.46	5.44	5.43
11,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.43	6.23	6.13	6.05	5.99	5.94	5.89	5.84	5.79	5.75	5.72	5.70	5.67	5.65	5.63	5.62	5.60	5.59	5.57	5.55	5.54	5.52
12,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.75	6.41	6.27	6.18	6.11	6.06	6.01	5.95	5.90	5.86	5.82	5.80	5.77	5.75	5.73	5.72	5.70	5.68	5.67	5.65	5.63	5.62
12,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.62	6.43	6.32	6.24	6.18	6.13	6.07	6.01	5.97	5.93	5.90	5.87	5.85	5.83	5.81	5.80	5.78	5.76	5.75	5.73	5.71
12,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.91	6.60	6.47	6.37	6.31	6.25	6.18	6.13	6.08	6.03	6.00	5.97	5.95	5.93	5.91	5.89	5.88	5.86	5.84	5.82	5.81
12,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.80	6.62	6.51	6.43	6.37	6.30	6.24	6.19	6.14	6.10	6.08	6.05	6.03	6.01	5.99	5.97	5.95	5.94	5.92	5.90
12,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.07	6.79	6.65	6.56	6.50	6.43	6.36	6.30	6.25	6.21	6.18	6.15	6.13	6.11	6.09	6.07	6.05	6.03	6.02	6.00
13,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	6.99	6.81	6.70	6.63	6.56	6.48	6.41	6.35	6.31	6.28	6.25	6.23	6.20	6.19	6.17	6.15	6.13	6.11	6.09
13,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.23	6.97	6.84	6.76	6.68	6.60	6.53	6.46	6.42	6.38	6.35	6.33	6.30	6.28	6.26	6.24	6.23	6.21	6.19
13,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.58	7.16	6.99	6.90	6.81	6.72	6.65	6.57	6.52	6.48	6.45	6.43	6.40	6.38	6.36	6.34	6.32	6.30	6.28
13,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.39	7.15	7.03	6.94	6.85	6.77	6.69	6.63	6.59	6.55	6.53	6.50	6.48	6.46	6.44	6.42	6.40	6.38
13,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.72	7.33	7.18	7.08	6.98	6.89	6.80	6.74	6.69	6.66	6.63	6.60	6.58	6.56	6.53	6.51	6.49	6.48
14,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.54	7.34	7.22	7.12	7.02	6.92	6.85	6.80	6.76	6.73	6.70	6.68	6.65	6.63	6.61	6.59	6.57
14,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.81	7.50	7.37	7.25	7.15	7.04	6.96	6.91	6.86	6.83	6.80	6.77	6.75	6.73	6.71	6.69	6.67
14,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.69	7.53	7.39	7.29	7.17	7.07	7.01	6.97	6.93	6.90	6.87	6.85	6.83	6.80	6.78	6.76
14,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.92	7.70	7.53	7.42	7.30	7.19	7.12	7.07	7.03	7.00	6.97	6.95	6.92	6.90	6.88	6.86
14,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.89	7.69	7.56	7.43	7.31	7.23	7.17	7.13	7.10	7.07	7.04	7.02	7.00	6.98	6.95
15,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.85	7.70	7.57	7.43	7.34	7.28	7.24	7.20	7.17	7.14	7.12	7.10	7.07	7.05
15,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	7.85	7.72	7.56	7.45	7.39	7.34	7.30	7.27	7.24	7.22	7.19	7.17	7.15
15,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.00	7.86	7.69	7.57	7.50	7.44	7.40	7.37	7.34	7.31	7.29	7.27	7.24
15,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.17	8.01	7.82	7.69	7.60	7.55	7.50	7.47	7.44	7.41	7.39	7.36	7.34
15,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.16	7.97	7.81	7.72	7.65	7.61	7.57	7.54	7.51	7.49	7.46	7.44
16,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.32	8.12	7.94	7.83	7.76	7.71	7.67	7.64	7.61	7.58	7.56	7.53
16,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.28	8.07	7.94	7.87	7.81	7.77	7.74	7.71	7.68	7.65	7.63
16,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.44	8.20	8.06	7.98	7.92	7.87	7.84	7.81	7.78	7.75	7.73
16,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.34	8.19	8.09	8.02	7.98	7.94	7.91	7.88	7.85	7.82
16,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.50	8.32	8.20	8.13	8.08	8.04	8.00	7.98	7.95	7.92
17,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.68	8.46	8.31	8.24	8.18	8.14	8.10	8.07	8.04	8.02
17,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.59	8.43	8.34	8.28	8.24	8.20	8.17	8.14	8.11
17,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.76	8.55	8.45	8.39	8.34	8.30	8.27	8.24	8.21
17,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.99	8.67	8.56	8.49	8.44	8.40	8.37	8.34	8.31
17,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.79	8.68	8.60	8.55	8.50	8.47	8.44	8.41
18,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	8.92	8.79	8.71	8.65	8.61	8.57	8.53	8.50
18,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.09	8.91	8.81	8.75	8.71	8.67	8.63	8.60
18,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.36	9.03	8.92	8.86	8.81	8.77	8.73	8.70
18,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.15	9.03	8.96	8.91	8.87	8.83	8.80
18,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.34	9.14	9.07	9.01	8.97	8.93	8.89
19,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.61	9.28	9.17	9.11	9.07	9.03	8.99
19,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.44	9.28	9.22	9.17	9.13	9.09
19,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.66	9.39	9.32	9.27	9.23	9.19
19,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.91	9.56	9.43	9.38	9.33	9.29
19,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.75	9.57	9.49	9.43	9.39
20,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	9.97	9.74	9.60	9.53	9.49
20,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	10.23	9.93	9.77	9.66	9.59
20,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	10.14	9.94	9.82	9.71
20,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	10.36	10.13	9.99	9.85
20,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	10.60	10.33	10.18	10.01
21,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	10.55	10.37	10.19
21,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	10.79	10.58	10.37
21,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	11.04	10.81	10.55
21,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	11.05	10.77
21,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	11.32	10.98
22,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	11.61	11.23
22,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	11.49
22,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	11.79
22,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	12.09
22,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
23,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
24,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
25,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
26,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
27,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
28,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
29,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
30,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00

Table 7 Diversion Inlet Control Structure (DICS) Gate Opening (ft) - Part C

Flow through DICS (cfs)	Staging Area Elevation at Wild Rice River, $Z_{STAGING-AREA-WRR}$ (ft)																																
	917	917.1	917.2	917.3	917.4	917.5	917.6	917.7	917.8	917.9	918	918.1	918.2	918.3	918.4	918.5	918.6	918.7	918.8	918.9	919	919.1	919.2	919.3	919.4	919.5	919.6	919.7	919.8	919.9	920	920.1	920.2	920.3
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
600	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26
700	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
800	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
900	0.42	0.42	0.42	0.42	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.39	0.39
1,000	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
1,100	0.51	0.51	0.51	0.51	0.51	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.48	0.48	0.48	0.48	0.48
1,200	0.56	0.56	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
1,300	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.57	0.57	0.57	0.57	0.57	0.57
1,400	0.65	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.61	0.61	0.61
1,500	0.70	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
1,600	0.74	0.74	0.74	0.74	0.74	0.74	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.70	0.70	0.70	0.70	0.70
1,700	0.79	0.79	0.79	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.74
1,800	0.84	0.83	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.79	0.79	0.79	0.79	0.79	0.79
1,900	0.88	0.88	0.88	0.88	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.83	0.83	0.83
2,000	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.88	0.88	0.88
2,100	0.97	0.97	0.97	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92
2,200	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.97	0.96	0.96
2,300	1.07	1.07	1.06	1.06	1.06	1.06	1.06	1.05	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01
2,400	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.09	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.08	1.08	1.07	1.07	1.07	1.07	1.07	1.06	1.06	1.06	1.06	1.06	1.06	1.05	1.05	1.05
2,500	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.13	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.09
2,600	1.21	1.20	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.18	1.18	1.18	1.18	1.18	1.17	1.17	1.17	1.17	1.17	1.16	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14
2,700	1.25	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.23	1.23	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.20	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.19	1.18	1.18
2,800	1.30	1.30	1.29	1.29	1.29	1.29	1.28	1.28	1.28	1.28	1.28	1.27	1.27	1.27	1.27	1.26	1.26	1.26	1.26	1.25	1.25	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.24	1.23	1.23	1.23	1.23	1.23
2,900	1.35	1.34	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.32	1.32	1.32	1.32	1.31	1.31	1.31	1.31	1.30	1.30	1.30	1.30	1.30	1.29	1.29	1.29	1.29	1.28	1.28	1.28	1.28	1.28	1.27	1.27	1.27
3,000	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.37	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.35	1.35	1.35	1.35	1.34	1.34	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.32	1.32	1.32	1.32	1.32	1.31
3,100	1.44	1.44	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.41	1.41	1.41	1.41	1.40	1.40	1.40	1.40	1.39	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.38	1.37	1.37	1.37	1.37	1.36	1.36	1.36	1.36
3,200	1.49	1.48	1.48	1.48	1.47	1.47	1.47	1.47	1.46	1.46	1.46	1.45	1.45	1.45	1.45	1.44	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.42	1.41	1.41	1.41	1.41	1.41	1.40	1.40
3,300	1.53	1.53	1.53	1.52	1.52	1.52	1.51	1.51	1.51	1.51	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.48	1.48	1.48	1.48	1.47	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.45	1.45	1.45	1.45	1.44
3,400	1.58	1.58	1.57	1.57	1.57	1.56	1.56	1.56	1.55	1.55	1.55	1.55	1.54	1.54	1.54	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.52	1.51	1.51	1.51	1.51	1.50	1.50	1.50	1.50	1.49	1.49	1.49
3,500	1.63	1.62	1.62	1.62	1.61	1.61	1.61	1.60	1.60	1.60	1.59	1.59	1.59	1.59	1.58	1.58	1.58	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.56	1.55	1.55	1.55	1.54	1.54	1.54	1.54	1.53	1.53
3,600	1.67	1.67	1.66	1.66	1.66	1.66	1.65	1.65	1.65	1.64	1.64	1.64	1.63	1.63	1.63	1.62	1.62	1.62	1.62	1.61	1.61	1.61	1.61	1.60	1.60	1.60	1.59	1.59	1.59	1.59	1.58	1.58	1.58	1.58
3,700	1.72	1.71	1.71	1.71	1.70	1.70	1.70	1.69	1.69	1.69	1.69	1.68	1.68	1.68	1.67	1.67	1.67	1.66	1.66	1.66	1.66	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.63	1.63	1.63	1.63	1.62	1.62
3,800	1.76	1.76	1.76	1.75	1.75	1.75	1.74	1.74	1.74	1.73	1.73	1.73	1.72	1.72	1.72	1.72	1.71	1.71	1.71	1.70	1.70	1.70	1.69	1.69	1.69	1.69	1.68	1.68	1.68	1.67	1.67	1.67	1.67	1.66
3,900	1.81	1.81	1.80	1.80	1.80	1.79	1.79	1.79	1.78	1.78	1.78	1.77	1.77	1.77	1.76	1.76	1.76	1.75	1.75	1.75	1.74	1.74	1.74	1.74	1.73	1.73	1.73	1.72	1.72	1.72	1.72	1.71	1.71	1.71
4,000	1.86	1.85	1.85	1.85	1.84	1.84	1.84	1.83	1.83	1.83	1.82	1.82	1.82	1.81	1.81	1.81	1.80	1.80	1.80	1.79	1.79	1.79	1.78	1.78	1.78	1.77	1.77	1.77	1.77	1.76	1.76	1.76	1.75	1.75
4,100	1.90	1.90	1.90	1.89	1.89	1.89	1.88	1.88	1.87	1.87	1.87	1.86	1.86	1.86	1.85	1.85	1.85	1.84	1.84	1.84	1.83	1.83	1.83	1.83	1.82	1.82	1.82	1.81	1.81	1.81	1.80	1.80	1.80	1.80
4,200	1.95	1.95	1.94	1.94	1.94	1.93	1.93	1.92	1.92	1.92	1.91	1.91	1.91	1.90	1.90	1.90	1.89	1.89	1.89	1.88	1.88	1.88	1.87	1.87	1.87	1.86	1.86	1.86	1.85	1.85	1.85	1.84	1.84	1.84
4,300	2.00	1.99	1.99	1.99	1.98	1.98	1.97	1.97	1.97	1.96	1.96	1.96	1.95	1.95	1.94	1.94	1.94	1.93	1.93	1.93	1.92	1.92	1.92	1.91	1.91	1.91	1.90	1.90	1.90	1.90	1.89	1.89	1.89	1.88
4,400	2.04	2.04	2.04	2.03	2.03	2.02	2.02	2.02	2.01	2.01	2.00	2.00	2.00	1.99	1.99	1.99	1.98	1.98	1.98	1.97	1.97	1.97	1.96	1.96	1.96	1.95	1.95	1.95	1.94	1.94	1.94	1.93	1.93	1.93
4,500	2.09	2.09	2.08	2.08	2.07	2.07	2.07	2.06	2.06	2.05	2.05	2.05	2.04	2.04	2.04	2.03	2.03	2.02	2.02	2.02	2.01	2.01	2.01	2.00	2.00	2.00	1.99	1.99	1.99	1.98	1.98	1.98	1.97	1.97
4,600	2.14	2.13	2.13	2.12	2.12	2.12	2.11	2.11	2.10	2.10	2.10	2.09	2.09	2.08	2.08	2.08	2.07	2.07	2.07	2.06	2.06	2.05	2.05	2.05	2.04	2.04	2.04	2.03	2.03	2.03	2.02	2.02	2.02	2.01
4,700	2.18	2.18	2.17	2.17	2.17	2.16	2.16	2.15	2.15	2.15	2.14	2.14	2.13	2.13	2.13	2.12	2.12	2.11	2.11	2.11	2.10	2.10	2.10	2.09	2.09	2.09	2.08	2.08	2.07	2.07	2.07	2.06	2.06	2.06
4,800	2.23	2.23	2.22	2.22	2.21	2.21	2.20	2.20	2.19	2.19	2.19	2.18	2.18	2.17	2.17	2.17	2.16	2.16	2.16	2.15	2.15	2.14	2.14	2.14	2.13	2.13	2.13	2.12	2.12	2.12	2.11	2.11	2.11	2.10
4,900	2.28	2.27	2.27	2.26	2.26	2.25	2.25	2.24	2.24	2.24	2.23	2.23	2.22	2.22	2.22	2.21	2.21	2.20	2.20	2.20	2.19	2.19	2.19	2.18	2.18	2.17	2.17	2.17	2.16	2.16	2.16	2.15	2.15	2.15
5,000	2.32	2.32	2.31	2.31	2.30	2.30	2.30	2.29	2.29	2.28	2.28	2.27	2.27	2.27	2.26	2.26	2.25	2.25	2.25	2.24	2.24	2.23	2.23	2.23	2.22	2.22	2.21	2.21	2.21	2.20	2.20	2.20	2.19	2.19
5,200	2.42	2.41	2.41	2.40	2.40	2.39	2.39	2.38	2.38	2.37	2.37	2.36	2.36	2.36	2.35	2.35	2.34	2.34	2.34	2.33	2.33	2.32	2.32	2.32	2.31	2.31	2.30	2.30	2.30	2.29	2.29	2.28	2.28	2.28
5,400	2.51	2.50	2.50	2.49	2.49	2.48	2.48	2.47	2.47	2.47	2.46	2.46	2.45	2.45	2.44	2.44	2.43	2.43	2.43	2.42	2.42	2.41	2.41	2.40	2.40	2.40	2.39	2.39	2.38	2.38	2.38	2.37	2.37	2.36
5,600	2.60	2.60	2.59	2.59	2.58	2.58	2.57	2.57	2.56	2.56	2.55	2.55	2.54	2.54	2.53	2.53	2.52	2.52	2.52	2.51	2.51	2.50	2.50	2.49	2.49	2.48	2.48	2.48	2.47	2.47	2.46	2.46	2.46	2.45
5,800	2.70	2.69	2.68	2.68	2.67	2.67	2.66	2.66	2.65	2.65	2.64	2.64	2.63	2.63	2.62	2.62	2.61	2.61	2.61	2.60	2.60	2.59	2.59	2.58	2.58	2.57	2.57	2.57	2.56	2.56	2.55	2.55	2.54	2.54
6,000	2.79	2.78	2.78	2.77	2.77	2.76	2.76	2.75	2.74	2.74	2.73	2.73	2.72	2.72	2.71	2.71	2.70	2.70	2.69	2.69	2.69	2.68	2.68	2.67	2.67	2.66	2.66	2.65	2.65	2.64	2.64	2.64	2.63	2.63
6,200	2.88	2.88	2.87	2.86	2.86	2.85	2.85	2.84	2.84	2.83	2.83	2.82	2.82	2.81	2.80	2.80	2.79	2.79	2.78	2.78	2.78	2.77	2.77	2.76	2.76	2.75	2.75	2.74	2.74	2.73	2.73	2.72	2.72	2.72
6,400	2.98	2.97	2.96	2.96	2.95	2.95	2.94	2.93	2.93	2.92	2.92	2.91	2.91	2.90	2.90	2.89	2.89	2.88	2.87	2.87	2.86	2.86	2.85	2.85	2.85	2.84	2.84	2.83	2.83	2.82	2.82	2.81	2.81	2.80
6,600	3.07	3.06	3.06	3.05	3.04	3.04	3.03	3.03	3.02	3.01	3.01	3.00	3.00	2.99	2.99	2.98	2.98	2.97	2.96	2.96	2.95	2.95	2.94	2.94	2.93	2.93	2.92	2.92	2.91	2.91	2.90	2.90	2.90	2.89
6,800	3.16	3.16	3.15	3.14	3.14	3.13	3.12	3.12	3.11	3.11	3.10	3.09	3.09	3.08	3.08	3.07	3.07	3.06	3.05	3.05	3.04	3.04	3.03	3.03	3.02	3.02	3.01	3.01	3.00	3.00	2.99	2.99	2.98	2.98
7,000	3.26	3.25	3.24	3.23	3.23	3.22	3.22	3.21	3.20	3.20	3.19	3.18	3.18	3.17	3.17	3.16	3.16	3.15	3.14	3.14	3.13	3.13	3.12	3.12	3.11	3.11	3.10	3.10	3.09	3.09	3.08	3.08	3.07	3.07
7,200	3.35	3.34	3.33	3.33	3.32	3.31	3.31	3.30	3.29	3.29	3.28	3.28	3.27	3.26	3.26	3.25	3.25	3.24	3.23	3.23	3.22	3.22	3.21	3.21	3.20	3.20	3.19	3.19	3.18	3.17	3.17	3.16	3.16	3.15
7,400	3.44	3.44	3.43	3.42	3.41	3.41	3.40	3.39	3.39	3.38	3.37	3.37	3.36	3.36	3.35	3.34	3.34	3.33	3.32	3.32	3.31	3.31	3.30	3.30	3.29	3.28	3.28	3.27	3.27	3.26	3.26	3.25	3.25	3.24
7,600	3.54	3.53	3.52	3.51	3.51	3.50	3.49	3.48	3.48	3.47	3.46	3.46	3.45	3.45	3.44	3.43	3.43	3.42	3.41	3.41	3.40	3.40	3.39	3.39	3.38	3.37	3.37	3.36	3.36	3.35	3.35	3.34	3.33	3.33
7,800	3.63	3.62	3.61	3.61	3.60	3.59	3.58	3.58	3.57	3.56	3.56	3.55	3.54	3.54	3.53	3.52	3.52	3.51	3.50	3.50	3.49	3.49	3.48	3.47	3.47	3.46	3.46	3.45	3.44	3.44	3.43	3.43	3.42	3.42
8,000	3.72	3.71	3.71	3.70	3.69	3.68	3.68	3.67	3.66	3.65	3.65	3.64	3.63	3.63	3.62	3.61	3.61	3.60	3.60	3.59	3.58	3.58	3.57	3.56	3.56	3.55	3.55	3.54	3.53	3.53	3.52	3.52	3.51	3.50
8,200	3.82	3.81	3.80	3.79	3.78	3.78	3.77	3.76	3.75	3.75	3.74	3.73	3.73	3.72	3.71	3.71	3.70	3.69	3.69	3.68	3.67	3.67	3.66	3.65	3.65	3.64	3.63	3.63	3.62	3.62	3.61	3.60	3.60	3.59
8,400	3.91	3.90	3.89	3.88	3.88	3.87	3.86	3.85	3.85	3.84	3.83	3.82	3.82	3.81	3.80	3.80	3.79	3.78	3.78	3.77	3.76	3.76	3.75	3.74	3.74	3.73	3.72	3.72	3.71	3.70	3.70	3.69	3.69	3.68
8,600	4.00	3.99	3.99	3.98	3.97	3.96	3.95	3.95	3.94	3.93	3.92	3.91	3.91	3.90	3.89	3.89	3.88	3.87	3.87	3.86	3.85	3.84	3.84	3.83	3.82	3.82	3.81	3.81	3.80	3.79	3.79	3.78	3.77	3.77
8,800	4.10	4.09	4.08	4.07	4.06	4.05	4.05	4.04	4.03	4.02	4.01	4.01	4.00	3.99	3.98	3.98	3.97	3.96	3.96	3.95	3.94	3.93	3.93	3.92	3.91	3.91	3.90	3.89	3.89	3.88	3.87	3.87	3.86	3.86
9,000	4.19	4.18	4.17	4.16	4.15	4.15	4.14	4.13	4.12	4.11	4.11	4.10	4.09	4.08	4.08	4.07	4.06	4.05	4.05	4.04	4.03	4.02	4.02	4.01	4.00	4.00	3.99	3.98	3.98	3.97	3.96	3.96	3.95	3.94
9,200	4.29	4.28	4.27	4.26	4.25	4.24	4.23	4.22	4.21	4.20	4.20	4.19	4.18	4.17	4.17	4.16	4.15	4.14	4.14	4.13	4.12	4.11	4.11	4.10	4.09	4.09	4.08	4.07	4.06	4.06	4.05	4.04	4.04	4.03
9,400	4.38	4.37	4.36	4.35	4.34	4.33	4.32	4.31	4.31	4.30	4.29	4.28	4.27	4.26	4.26	4.25	4.24	4.23	4.23	4.22	4.21	4.20	4.20	4.19	4.18	4.17	4.17	4.16	4.15	4.15	4.14	4.13	4.13	4.12
9,600	4.47	4.46	4.45	4.44	4.43	4.42	4.41	4.41	4.40	4.39	4.38	4.37	4.36	4.36	4.35	4.34	4.33	4.32	4.32	4.31	4.30	4.29	4.29	4.28	4.27	4.26	4.26	4.25	4.24	4.23	4.23	4.22	4.21	4.21
9,800	4.57	4.56	4.55	4.54	4.53	4.52	4.51	4.50	4.49	4.48	4.47	4.46	4.45	4.45	4.44	4.43	4.42	4.41	4.41	4.40	4.39	4.38	4.37	4.37	4.36	4.35	4.34	4.34	4.33	4.32	4.32	4.31	4.30	4.29
10,000	4.66	4.65	4.64	4.63	4.62	4.61	4.60	4.59	4.58	4.57	4.56	4.55	4.55	4.54	4.53	4.52	4.51	4.50	4.50	4.49	4.48	4.47	4.46	4.46	4.45	4.44	4.43	4.43	4.42	4.41	4.40	4.40	4.39	4.38
10,200	4.75	4.74	4.73	4.72	4.71	4.70	4.69	4.68	4.67	4.66	4.65	4.65	4.64	4.63	4.62	4.61	4.60	4.59	4.59	4.58	4.57	4.56	4.55	4.55	4.54	4.53	4.52	4.51	4.51	4.50	4.49	4.48	4.48	4.47
10,400	4.85	4.84	4.83	4.82	4.81	4.79	4.78	4.77	4.77	4.76	4.75	4.74	4.73	4.72	4.71	4.70	4.69	4.69	4.68	4.67	4.66	4.65	4.64	4.64	4.63	4.62	4.61	4.60	4.60	4.59	4.58	4.57	4.57	4.56
10,600	4.94	4.93	4.92	4.91	4.90	4.89	4.88	4.87	4.86	4.85	4.84	4.83	4.82	4.81	4.80	4.79	4.78	4.78	4.77	4.76	4.75	4.74	4.73	4.72	4.72	4.71	4.70	4.69	4.68	4.68	4.67	4.66	4.65	4.65
10,800	5.04	5.02	5.01	5.00	4.99	4.98	4.97	4.96	4.95	4.94	4.93	4.92	4.91	4.90	4.89	4.88	4.87	4.87	4.86	4.85	4.84	4.83	4.82	4.81	4.81	4.80	4.79	4.78	4.77	4.76	4.76	4.75	4.74	4.73
11,000	5.13	5.12	5.11	5.10	5.08	5.07	5.06	5.05	5.04	5.03	5.02	5.01	5.00	4.99	4.98	4.97	4.97	4.96	4.95	4.94	4.93	4.92	4.91	4.90	4.90	4.89	4.88	4.87	4.86	4.85	4.85	4.84	4.83	4.82
11,200	5.23	5.21	5.20	5.19	5.18	5.17	5.16	5.14	5.13	5.12	5.11	5.10	5.09	5.08	5.08	5.07	5.06	5.05	5.04	5.03	5.02	5.01	5.00	4.99	4.98	4.98	4.97	4.96	4.95	4.94	4.93	4.93	4.92	4.91
11,400	5.32	5.31	5.29	5.28	5.27	5.26	5.25	5.24	5.23	5.22	5.21	5.20	5.19	5.18	5.17	5.16	5.15	5.14	5.13	5.12	5.11	5.10	5.09	5.08	5.07	5.06	5.06	5.05	5.04	5.03	5.02	5.01	5.01	5.00
11,600	5.41	5.40	5.39	5.38	5.36	5.35	5.34	5.33	5.32	5.31	5.30	5.29	5.28	5.27	5.26	5.25	5.24	5.23	5.22	5.21	5.20	5.19	5.18	5.17	5.16	5.15	5.14	5.14	5.13	5.12	5.11	5.10	5.09	5.08
11,800	5.51	5.49	5.48	5.47	5.46	5.44	5.43	5.42	5.41	5.40	5.39	5.38	5.37	5.36	5.35	5.34	5.33	5.32	5.31	5.30	5.29	5.28	5.27	5.26	5.25	5.24	5.23	5.22	5.22	5.21	5.20	5.19	5.18	5.17
12,000	5.60	5.59	5.58	5.56	5.55	5.54	5.53	5.51	5.50	5.49	5.48	5.47	5.46	5.45	5.44	5.43	5.42	5.41	5.40	5.39	5.38	5.37	5.36	5.35	5.34	5.33	5.32	5.31	5.30	5.30	5.29	5.28	5.27	5.26
12,200	5.70	5.68	5.67	5.66	5.64	5.63	5.62	5.61	5.60	5.58	5.57	5.56	5.55	5.54	5.53	5.52	5.51	5.50	5.49	5.48	5.47	5.46	5.45	5.44	5.43	5.42	5.41	5.40	5.39	5.38	5.38	5.37	5.36	5.35
12,400	5.79	5.78	5.76	5.75	5.74	5.72	5.71	5.70	5.69	5.68	5.66	5.65	5.64	5.63	5.62	5.61	5.60	5.59	5.58	5.57	5.56	5.55	5.54	5.53	5.52	5.51	5.50	5.49	5.48	5.47	5.46	5.45	5.45	5.44
12,600	5.89	5.87	5.86	5.84	5.83	5.82	5.80	5.79	5.78	5.77	5.76	5.75	5.73	5.72	5.71	5.70	5.69	5.68	5.67	5.66	5.65	5.64	5.63	5.62	5.61	5.60	5.59	5.58	5.57	5.56	5.55	5.54	5.53	5.52
12,800	5.98	5.97	5.95	5.94	5.92	5.91	5.90	5.88	5.87	5.86	5.85	5.84	5.83	5.81	5.80	5.79	5.78	5.77	5.76	5.75	5.74	5.73	5.72	5.71	5.70	5.69	5.68	5.67	5.66	5.65	5.64	5.63	5.62	5.61
13,000	6.08	6.06	6.04	6.03	6.02	6.00	5.99	5.98	5.96	5.95	5.94	5.93	5.92	5.91	5.89	5.88	5.87	5.86	5.85	5.84	5.83	5.82	5.81	5.80	5.79	5.78	5.77	5.76	5.75	5.74	5.73	5.72	5.71	5.70
13,200	6.17	6.15	6.14	6.12	6.11	6.10	6.08	6.07	6.06	6.04	6.03	6.02	6.01	6.00	5.99	5.97	5.96	5.95	5.94	5.93	5.92	5.91	5.90	5.89	5.88	5.87	5.86	5.85	5.84	5.83	5.82	5.81	5.80	5.79
13,400	6.27	6.25	6.23	6.22	6.20	6.19	6.18	6.16	6.15	6.14	6.12	6.11	6.10	6.09	6.08	6.07	6.05	6.04	6.03	6.02	6.01	6.00	5.99	5.98	5.97	5.96	5.95	5.94	5.93	5.92	5.91	5.90	5.89	5.88
13,600	6.36	6.34	6.33	6.31	6.30	6.28	6.27	6.25	6.24	6.23	6.22	6.20	6.19	6.18	6.17	6.16	6.14	6.13	6.12	6.11	6.10	6.09	6.08	6.07	6.06	6.05	6.03	6.02	6.01	6.00	5.99	5.98	5.97	5.96
13,800	6.46	6.44	6.42	6.41	6.39	6.38	6.36	6.35	6.33	6.32	6.31	6.30	6.28	6.27	6.26	6.25	6.24	6.22	6.21	6.20	6.19	6.18	6.17	6.16	6.15	6.13	6.12	6.11	6.10	6.09	6.08	6.07	6.06	6.05
14,000	6.55	6.53	6.52	6.50	6.48	6.47	6.45	6.44	6.43	6.41	6.40	6.39	6.37	6.36	6.35	6.34	6.33	6.31	6.30	6.29	6.28	6.27	6.26	6.25	6.23	6.22	6.21	6.20	6.19	6.18	6.17	6.16	6.15	6.14
14,200	6.65	6.63	6.61	6.59	6.58	6.56	6.55	6.53	6.52	6.51	6.49	6.48	6.47	6.45	6.44	6.43	6.42	6.41	6.39	6.38	6.37	6.36	6.35	6.34	6.32	6.31	6.30	6.29	6.28	6.27	6.26	6.25	6.24	6.23
14,400	6.74	6.72	6.70	6.69	6.67	6.66	6.64	6.63	6.61	6.60	6.58	6.57	6.56	6.55	6.53	6.52	6.51	6.50	6.48	6.47	6.46	6.45	6.44	6.42	6.41	6.40	6.39	6.38	6.37	6.36	6.35	6.34	6.33	6.32
14,600	6.84	6.82	6.80	6.78	6.76	6.75	6.73	6.72	6.70	6.69	6.68	6.66	6.65	6.64	6.62	6.61	6.60	6.59	6.57	6.56	6.55	6.54	6.53	6.51	6.50	6.49	6.48	6.47	6.46	6.45	6.44	6.42	6.41	6.40
14,800	6.93	6.91	6.89	6.88	6.86	6.84	6.83	6.81	6.80	6.78	6.77	6.75	6.74	6.73	6.72	6.70	6.69	6.68	6.66	6.65	6.64	6.63	6.62	6.60	6.59	6.58	6.57	6.56	6.55	6.54	6.52	6.51	6.50	6.49
15,000	7.03	7.01	6.99	6.97	6.95	6.94	6.92	6.90	6.89	6.87	6.86	6.85	6.83	6.82	6.81	6.79	6.78	6.77	6.76	6.74	6.73	6.72	6.71	6.69	6.68	6.67	6.66	6.65	6.64	6.62	6.61	6.60	6.59	6.58
15,200	7.12	7.10	7.08	7.06	7.05	7.03	7.01	7.00	6.98	6.97	6.95	6.94	6.92	6.91	6.90	6.88	6.87	6.86	6.85	6.83	6.82	6.81	6.80	6.78	6.77	6.76	6.75	6.74	6.72	6.71	6.70	6.69	6.68	6.67
15,400	7.22	7.20	7.18	7.16	7.14	7.12	7.11	7.09	7.07	7.06	7.04	7.03	7.02	7.00	6.99	6.98	6.96	6.95	6.94	6.92	6.91	6.90	6.89	6.87	6.86	6.85	6.84	6.82	6.81	6.80	6.79	6.78	6.77	6.76
15,600	7.32	7.29	7.27	7.25	7.23	7.22	7.20	7.18	7.17	7.15	7.14	7.12	7.11	7.09	7.08	7.07	7.05	7.04	7.03	7.01	7.00	6.99	6.98	6.96	6.95	6.94	6.93	6.91	6.90	6.89	6.88	6.87	6.85	6.84
15,800	7.41	7.39	7.37	7.35	7.33	7.31	7.29	7.28	7.26	7.24	7.23	7.21	7.20	7.19	7.17	7.16	7.14	7.13	7.12	7.10	7.09	7.08	7.06	7.05	7.04	7.03	7.01	7.00	6.99	6.98	6.97	6.95	6.94	6.93
16,000	7.51	7.49	7.46	7.44	7.42	7.40	7.39	7.37	7.35	7.34	7.32	7.31	7.29	7.28	7.26	7.25	7.24	7.22	7.21	7.19	7.18	7.17	7.15	7.14	7.13	7.12	7.10	7.09	7.08	7.07	7.05	7.04	7.03	7.02
16,200	7.60	7.58	7.56	7.54	7.52	7.50	7.48	7.46	7.45	7.43	7.41	7.40	7.38	7.37	7.36	7.34	7.33	7.31	7.30	7.28	7.27	7.26	7.24	7.23	7.22	7.21	7.19	7.18	7.17	7.16	7.14	7.13	7.12	7.11
16,400	7.70	7.68	7.65	7.63	7.61	7.59	7.57	7.56	7.54	7.52	7.51	7.49	7.48	7.46	7.45	7.43	7.42	7.40	7.39	7.38	7.36	7.35	7.33	7.32	7.31	7.29	7.28	7.27	7.26	7.24	7.23	7.22	7.21	7.20
16,600	7.80	7.77	7.75	7.73	7.70	7.68	7.67	7.65	7.63	7.61	7.60	7.58	7.57	7.55	7.54	7.52	7.51	7.49	7.48	7.47	7.45	7.44	7.42	7.41	7.40	7.38	7.37	7.36	7.35	7.33	7.32	7.31	7.30	7.28
16,800	7.89	7.87	7.84	7.82	7.80	7.78	7.76	7.74	7.72	7.71	7.69	7.67	7.66	7.64	7.63	7.61	7.60	7.59	7.57	7.56	7.54	7.53	7.51	7.50	7.49	7.47	7.46	7.45	7.43	7.42	7.41	7.40	7.38	7.37
17,000	7.99	7.96	7.94	7.91	7.89	7.87	7.85	7.83	7.82	7.80	7.78	7.77	7.75	7.74	7.72	7.71	7.69	7.68	7.66	7.65	7.63	7.62	7.60	7.59	7.58	7.56	7.55	7.54	7.52	7.51	7.50	7.48	7.47	7.46
17,200	8.09	8.06	8.03	8.01	7.99	7.97	7.95	7.93	7.91	7.89	7.88	7.86	7.84	7.83	7.81	7.80	7.78	7.77	7.75	7.74	7.72	7.71	7.69	7.68	7.67	7.65	7.64	7.63	7.61	7.60	7.59	7.57	7.56	7.55
17,400	8.18	8.16	8.13	8.10	8.08	8.06	8.04	8.02	8.00	7.99	7.97	7.95	7.94	7.92	7.90	7.89	7.87	7.86	7.84	7.83	7.81	7.80	7.78	7.77	7.76	7.74	7.73	7.71	7.70	7.69	7.67	7.66	7.65	7.64
17,600	8.28	8.25	8.23	8.20	8.18	8.15	8.13	8.11	8.10	8.08	8.06	8.04	8.03	8.01	8.00	7.98	7.96	7.95	7.93	7.92	7.90	7.89	7.87	7.86	7.85	7.83	7.82	7.80	7.79	7.78	7.76	7.75	7.74	7.72
17,800	8.38	8.35	8.32	8.29	8.27	8.25	8.23	8.21	8.19	8.17	8.15	8.14	8.12	8.10	8.09	8.07	8.06	8.04	8.02	8.01	7.99	7.98	7.96	7.95	7.93	7.92	7.91	7.89	7.88	7.86	7.85	7.84	7.82	7.81
18,000	8.47	8.44	8.42	8.39	8.37	8.34	8.32	8.30	8.28	8.26	8.25	8.23	8.21	8.19	8.18	8.16	8.15	8.13	8.11	8.10	8.08	8.07	8.05	8.04	8.02	8.01	8.00	7.98	7.97	7.95	7.94	7.93	7.91	7.90
18,200	8.57	8.54	8.51	8.49	8.46	8.44	8.41	8.39	8.38	8.36	8.34	8.32	8.30	8.29	8.27	8.25	8.24	8.22	8.21	8.19	8.17	8.16	8.14	8.13	8.11	8.10	8.08	8.07	8.06	8.04	8.03	8.01	8.00	7.99
18,400	8.67	8.64	8.61	8.58	8.55	8.53	8.51	8.49	8.47	8.45	8.43	8.41	8.40	8.38	8.36	8.35	8.33	8.31	8.30	8.28	8.26	8.25	8.23	8.22	8.20	8.19	8.17	8.16	8.15	8.13	8.12	8.10	8.09	8.08
18,600	8.76	8.73	8.70	8.68	8.65	8.63	8.60	8.58	8.56	8.54	8.52	8.50	8.49	8.47	8.45	8.44	8.42	8.40	8.39	8.37	8.36	8.34	8.32	8.31	8.29	8.28	8.26	8.25	8.23	8.22	8.21	8.19	8.18	8.16
18,800	8.86	8.83	8.80	8.77	8.74	8.72	8.70	8.68	8.65	8.63	8.62	8.60	8.58	8.56	8.55	8.53	8.51	8.49	8.48	8.46	8.45	8.43	8.41	8.40	8.38	8.37	8.35	8.34	8.32	8.31	8.29	8.28	8.27	8.25
19,000	8.96	8.93	8.90	8.87	8.84	8.81	8.79	8.77	8.75	8.73	8.71	8.69	8.67	8.65	8.64	8.62	8.60	8.59	8.57	8.55	8.54	8.52	8.50	8.49	8.47	8.46	8.44	8.43	8.41	8.40	8.38	8.37	8.35	8.34
19,200	9.06	9.03	8.99	8.96	8.93	8.91	8.88	8.86	8.84	8.82	8.80	8.78	8.76	8.75	8.73	8.71	8.69	8.68	8.66	8.64	8.63	8.61	8.59	8.58	8.56	8.55	8.53	8.52	8.50	8.49	8.47	8.46	8.44	8.43
19,400	9.16	9.12	9.09	9.06	9.03	9.00	8.98	8.96	8.93	8.91	8.89	8.87	8.86	8.84	8.82	8.80	8.79	8.77	8.75	8.73	8.72	8.70	8.68	8.67	8.65	8.64	8.62	8.61	8.59	8.57	8.56	8.55	8.53	8.52
19,600	9.25	9.22	9.19	9.16	9.13	9.10	9.07	9.05	9.03	9.01	8.99	8.97	8.95	8.93	8.91	8.89	8.88	8.86	8.84	8.82	8.81	8.79	8.77	8.76	8.74	8.73	8.71	8.69	8.68	8.66	8.65	8.63	8.62	8.60
19,800	9.35	9.32	9.28	9.25	9.22	9.19	9.17	9.14	9.12	9.10	9.08	9.06	9.04	9.02	9.00	8.99	8.97	8.95	8.93	8.92	8.90	8.88	8.86	8.85	8.83	8.82	8.80	8.78	8.77	8.75	8.74	8.72	8.71	8.69
20,000	9.45	9.41	9.38	9.35	9.32	9.29	9.26	9.24	9.22	9.19	9.17	9.15	9.13	9.11	9.10	9.08	9.06	9.04	9.02	9.01	8.99	8.97	8.95	8.94	8.92	8.90	8.89	8.87	8.86	8.84	8.83	8.81	8.80	8.78
20,200	9.55	9.51	9.48	9.44	9.41	9.38	9.36	9.33	9.31	9.29	9.27	9.24	9.23	9.21	9.19	9.17	9.15	9.13	9.11	9.10	9.08	9.06	9.04	9.03	9.01	8.99	8.98	8.96	8.95	8.93	8.91	8.90	8.88	8.87
20,400	9.65	9.61	9.57	9.54	9.51	9.48	9.45	9.43	9.40	9.38	9.36	9.34	9.32	9.30	9.28	9.26	9.24	9.22	9.21	9.19	9.17	9.15	9.13	9.12	9.10	9.08	9.07	9.05	9.04	9.02	9.00	8.99	8.97	8.96
20,600	9.76	9.71	9.67	9.64	9.60	9.57	9.54	9.52	9.50	9.47	9.45	9.43	9.41	9.39	9.37	9.35	9.33	9.31	9.30	9.28	9.26	9.24	9.23	9.21	9.19	9.17	9.16	9.14	9.12	9.11	9.09	9.08	9.06	9.05
20,800	9.90	9.81	9.77	9.73	9.70	9.67	9.64	9.61	9.59	9.57	9.54	9.52	9.50	9.48	9.46	9.44	9.43	9.41	9.39	9.37	9.35	9.33	9.32	9.30	9.28	9.26	9.25	9.23	9.21	9.20	9.18	9.16	9.15	9.13
21,000	10.07	9.96	9.89	9.84	9.80	9.76	9.73	9.71	9.68	9.66	9.64	9.62	9.59	9.57	9.56	9.54	9.52	9.50	9.48	9.46	9.44	9.42	9.41	9.39	9.37	9.35	9.34	9.32	9.30	9.29	9.27	9.25	9.24	9.22
21,200	10.24	10.12	10.03	9.95	9.89	9.86	9.83	9.80	9.78	9.75	9.73	9.71	9.69	9.67	9.65	9.63	9.61	9.59	9.57	9.55	9.53	9.51	9.50	9.48	9.46	9.44	9.43	9.41	9.39	9.37	9.36	9.34	9.33	9.31
21,400	10.41	10.29	10.18	10.09	9.99	9.95	9.92	9.90	9.87	9.85	9.82	9.80	9.78	9.76	9.74	9.72	9.70	9.68	9.66	9.64	9.62	9.60	9.59	9.57	9.55	9.53	9.51	9.50	9.48	9.46	9.45	9.43	9.41	9.40
21,600	10.59	10.45	10.34	10.24	10.13	10.07	10.03	9.99	9.96	9.94	9.92	9.89	9.87	9.85	9.83	9.81	9.79	9.77	9.75	9.73	9.71	9.69	9.68	9.66	9.64	9.62	9.60	9.59	9.57	9.55	9.54	9.52	9.50	9.49
21,800	10.79	10.63	10.49	10.39	10.29	10.21	10.16	10.11	10.08	10.04	10.01	9.99	9.96	9.94	9.92	9.90	9.88	9.86	9.84	9.82	9.80	9.79	9.77	9.75	9.73	9.71	9.69	9.68	9.66	9.64	9.62	9.61	9.59	9.57
22,000	11.00	10.83	10.68	10.54	10.44	10.36	10.29	10.24	10.20	10.16	10.12	10.09	10.06	10.04	10.02	9.99	9.97	9.95	9.93	9.91	9.89	9.88	9.86	9.84	9.82	9.80	9.78	9.77	9.75	9.73	9.71	9.70	9.68	9.66
22,200	11.23	11.03	10.86	10.72	10.60	10.50	10.42	10.36	10.32	10.27	10.23	10.20	10.17	10.14	10.11	10.09	10.07	10.05	10.03	10.01	9.99	9.97	9.95	9.93	9.91	9.89	9.87	9.85	9.84	9.82	9.80	9.78	9.77	9.75
22,400	11.47	11.25	11.06	10.90	10.78	10.66	10.56	10.49	10.44	10.38	10.34	10.31	10.27	10.24	10.21	10.18	10.16	10.14	10.12	10.10	10.08	10.06	10.04	10.02	10.00	9.98	9.96	9.94	9.93	9.91	9.89	9.87	9.86	9.84
22,600	11.74	11.48	11.27	11.09	10.95	10.83	10.72	10.64	10.57	10.50	10.45	10.41	10.38	10.34	10.31	10.27	10.25	10.23	10.21	10.19	10.17	10.15	10.13	10.11	10.09	10.07	10.05	10.03	10.02	10.00	9.98	9.96	9.94	9.93
22,800	12.02	11.74	11.49	11.30	11.14	10.99	10.88	10.80	10.72	10.64	10.58	10.53	10.48	10.45	10.40	10.36	10.34	10.32	10.30	10.28	10.26	10.24	10.22	10.20	10.18	10.16	10.14	10.12	10.10	10.09	10.07	10.05	10.03	10.02
23,000	12.33	12.00	11.74	11.51	11.34	11.19	11.05	10.95	10.87	10.79	10.73	10.67	10.61	10.56	10.50	10.45	10.43	10.41	10.39	10.37	10.35	10.33	10.31	10.29	10.27	10.25	10.23	10.21	10.19	10.18	10.16	10.14	10.12	10.10
23,200	26.00	12.30	11.99	11.75	11.55	11.38	11.24	11.12	11.02	10.94	10.87	10.81	10.75	10.69	10.64	10.57	10.53	10.50	10.48	10.46	10.44	10.42	10.40	10.38	10.36	10.34	10.32	10.30	10.28	10.26	10.25	10.23	10.21	10.19
23,400	26.00	12.63	12.28	12.00	11.78	11.59	11.42	11.30	11.20	11.10	11.01	10.94	10.88	10.83	10.77	10.71	10.67	10.63	10.60	10.57	10.54	10.51	10.49	10.47	10.45	10.43	10.41	10.39	10.37	10.35	10.33	10.32	10.30	10.28
23,600	26.00	26.00	12.57	12.27	12.01	11.81	11.63	11.48	11.37	11.27	11.18	11.10	11.02	10.96	10.90	10.84	10.80	10.75	10.72	10.68	10.65	10.62	10.59	10.57	10.54	10.52	10.50	10.48	10.46	10.44	10.42	10.41	10.39	10.37
23,800	26.00	26.00	26.00	12.55	12.28	12.04	11.84	11.69	11.56	11.44	11.35	11.26	11.18	11.11	11.04	10.98	10.93	10.88	10.84	10.80	10.76	10.73	10.70	10.67	10.65	10.62	10.60	10.57	10.55	10.53	10.51	10.49	10.48	10.46
24,000	26.00	26.00	26.00	12.87	12.55	12.29	12.07	11.90	11.76	11.63	11.52	11.43	11.34	11.27	11.19	11.13	11.07	11.01	10.96	10.92	10.88	10.84	10.81	10.78	10.75	10.72	10.69	10.66	10.64	10.62	10.60	10.58	10.56	10.55
24,200	26.00	26.00	26.00	26.00	12.86	12.56	12.31	12.12	11.97	11.83	11.71	11.60	11.50	11.42	11.35	11.28	11.21	11.15	11.09	11.04	10.99	10.95	10.91	10.88	10.85	10.82	10.79	10.75	10.73	10.71	10.69	10.67	10.65	10.63
24,400	26.00	26.00	26.00	26.00	13.21	12.85	12.57	12.36	12.19	12.03	11.90	11.79	11.69	11.59	11.50	11.43	11.36	11.29	11.23	11.18	11.12	11.07	11.02	10.98	10.95	10.92	10.89	10.84	10.82	10.80	10.78	10.76	10.74	10.72
24,600	26.00	26.00	26.00	26.00	26.00	13.15	12.84	12.61	12.42	12.25	12.11	11.98	11.87	11.77	11.68	11.59	11.51	11.44	11.37	11.31	11.26	11.20	11.15	11.11	11.06	11.02	10.99	10.93	10.91	10.89	10.87	10.85	10.83	10.81
24,800	26.00	26.00	26.00	26.00	26.00	26.00	13.14	12.88	12.67	12.48	12.33	12.19	12.06	11.95	11.85	11.76	11.68	11.59	11.52	11.45	11.39	11.33	11.28	11.23	11.19	11.14	11.10	11.03	11.00	10.98	10.96	10.94	10.92	10.90
25,000	26.00	26.00	26.00	26.00	26.00	26.00	13.45	13.17	12.94	12.73	12.55	12.41	12.27	12.15	12.03	11.94	11.85	11.76	11.68	11.60	11.53	11.47	11.41	11.36	11.31	11.27	11.22	11.15	11.12	11.09	11.06	11.03	11.01	10.99
25,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	13.49	13.22	12.98	12.80	12.64	12.48	12.35	12.24	12.13	12.02	11.93	11.84	11.76	11.69	11.62	11.55	11.49	11.43	11.39	11.34	11.28	11.24	11.21	11.17	11.14	11.12	11.09
25,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	13.52	13.26	13.05	12.88	12.72	12.57	12.44	12.32	12.21	12.11	12.01	11.92	11.84	11.77	11.70	11.63	11.57	11.51	11.46	11.41	11.37	11.33	11.29	11.26	11.23	11.20
25,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	13.90	13.55	13.33	13.14	12.95	12.80	12.66	12.52	12.41	12.30	12.19	12.10	12.00	11.92	11.85	11.78	11.71	11.65	11.60	11.54	11.49	11.45	11.41	11.37	11.33	11.30
25,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	13.86	13.62	13.41	13.22	13.04	12.88	12.75	12.61	12.49	12.38	12.28	12.18	12.09	12.00	11.93	11.86	11.80	11.74	11.68	11.62	11.57	11.52	11.48	11.44	11.41
26,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	13.93	13.70	13.48	13.30	13.13	12.97	12.83	12.70	12.58	12.46	12.36	12.27	12.18	12.09	12.01	11.94	11.88	11.82	11.76	11.70	11.65	11.61	11.56	11.52
26,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.01	13.78	13.56	13.38	13.22	13.06	12.92	12.79	12.67	12.55	12.44	12.35	12.26	12.17	12.09	12.02	11.95	11.89	11.84	11.78	11.73	11.69	11.64
26,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.12	13.85	13.65	13.47	13.31	13.15	13.00	12.87	12.75	12.64	12.53	12.43	12.34	12.26	12.18	12.11	12.03	11.97	11.91	11.86	11.81	11.76
26,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.18	13.94	13.74	13.56	13.39	13.24	13.09	12.96	12.84	12.72	12.61	12.51	12.42	12.34	12.26	12.19	12.12	12.05	11.99	11.94	11.89
26,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.23	14.02	13.83	13.65	13.47	13.32	13.18	13.04	12.92	12.81	12.70	12.60	12.50	12.42	12.35	12.27	12.20	12.13	12.07	12.01
27,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.32	14.11	13.91	13.73	13.56	13.41	13.26	13.13	13.00	12.89	12.79	12.69	12.59	12.50	12.42	12.35	12.28	12.22	12.15
27,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.41	14.20	14.00	13.82	13.65	13.49	13.35	13.22	13.09	12.97	12.87	12.77	12.68	12.59	12.50	12.43	12.36	12.30
27,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.50	14.29	14.09	13.90	13.74	13.58	13.43	13.30	13.18	13.06	12.95	12.86	12.76	12.67	12.59	12.51	12.44
27,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.61	14.37	14.17	13.99	13.82	13.67	13.52	13.39	13.27	13.15	13.04	12.94	12.84	12.76	12.67	12.59
27,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.68	14.46	14.26	14.08	13.91	13.75	13.61	13.47	13.35	13.24	13.13	13.02	12.93	12.84	12.76
28,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.75	14.54	14.35	14.17	13.99	13.84	13.70	13.56	13.44	13.32	13.21	13.11	13.01	12.92
28,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.85	14.64	14.44	14.26	14.09	13.93	13.79	13.65	13.52	13.41	13.30	13.20	13.10
28,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.94	14.73	14.53	14.35	14.18	14.02	13.88	13.74	13.61	13.49	13.38	13.28
28,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.82	14.62	14.44	14.27	14.11	13.97	13.83	13.70	13.58	13.47
28,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.91	14.72	14.53	14.36	14.21	14.05	13.92	13.79	13.67
29,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	15.00	14.80	14.62	14.45	14.29	14.14	14.00	13.87
29,200	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.88	14.70	14.52	14.37	14.22	14.08
29,400	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.96	14.76	14.59	14.44	14.29
29,600	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.99	14.80	14.64	14.49
29,800	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.83	14.67
30,000	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	14.85

Table 7 Diversion Inlet Control Structure (DICS) Gate Opening (ft) - Part D

Flow through DICS (cfs)	Staging Area Elevation at Wild Rice River, $Z_{STAGING-AREA-WRR}$ (ft)																																	
	920.4	920.5	920.6	920.7	920.8	920.9	921	921.1	921.2	921.3	921.4	921.5	921.6	921.7	921.8	921.9	922	922.1	922.2	922.3	922.4	922.5	922.6	922.7	922.8	922.9	923	923.1	923.2	923.3	923.4	923.5	923.6	923.7
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
600	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
700	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
800	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.33	0.33	0.33	0.33	0.33
900	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.37
1,000	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
1,100	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
1,200	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
1,300	0.57	0.57	0.57	0.57	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.54	0.54	0.54	0.54	0.54	0.54
1,400	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.58	0.58
1,500	0.66	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.62
1,600	0.70	0.70	0.70	0.70	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
1,700	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
1,800	0.79	0.79	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.75	0.75	0.75	0.75	0.75	0.75
1,900	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.79	0.79	0.79	0.79
2,000	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.83	0.83	0.83
2,100	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.87
2,200	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
2,300	1.01	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.96
2,400	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00
2,500	1.09	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.08	1.08	1.07	1.07	1.07	1.07	1.07	1.07	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.05	1.05	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04
2,600	1.14	1.13	1.13	1.13	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10	1.10	1.10	1.10	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.08	1.08
2,700	1.18	1.18	1.18	1.17	1.17	1.17	1.17	1.17	1.17	1.16	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.15	1.15	1.14	1.14	1.14	1.14	1.14	1.14	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.12
2,800	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21	1.20	1.20	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.19	1.19	1.18	1.18	1.18	1.18	1.18	1.18	1.17	1.17	1.17	1.17	1.17	1.17
2,900	1.27	1.27	1.26	1.26	1.26	1.26	1.26	1.25	1.25	1.25	1.25	1.25	1.24	1.24	1.24	1.24	1.24	1.23	1.23	1.23	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.21
3,000	1.31	1.31	1.31	1.30	1.30	1.30	1.30	1.30	1.29	1.29	1.29	1.29	1.29	1.29	1.28	1.28	1.28	1.28	1.28	1.27	1.27	1.27	1.27	1.27	1.26	1.26	1.26	1.26	1.26	1.26	1.25	1.25	1.25	1.25
3,100	1.35	1.35	1.35	1.35	1.35	1.34	1.34	1.34	1.34	1.34	1.33	1.33	1.33	1.33	1.33	1.32	1.32	1.32	1.32	1.32	1.31	1.31	1.31	1.31	1.31	1.30	1.30	1.30	1.30	1.30	1.30	1.29	1.29	1.29
3,200	1.40	1.40	1.39	1.39	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.37	1.37	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.36	1.35	1.35	1.35	1.35	1.35	1.34	1.34	1.34	1.34	1.34	1.34	1.33	1.33
3,300	1.44	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.42	1.42	1.41	1.41	1.41	1.41	1.41	1.40	1.40	1.40	1.40	1.40	1.39	1.39	1.39	1.39	1.39	1.38	1.38	1.38	1.38	1.38	1.37
3,400	1.49	1.48	1.48	1.48	1.48	1.47	1.47	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.45	1.45	1.45	1.45	1.45	1.44	1.44	1.44	1.44	1.44	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.42	1.42	1.42
3,500	1.53	1.53	1.52	1.52	1.52	1.52	1.52	1.51	1.51	1.51	1.51	1.50	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.49	1.48	1.48	1.48	1.48	1.48	1.47	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.46
3,600	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.56	1.55	1.55	1.55	1.55	1.54	1.54	1.54	1.54	1.54	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.52	1.52	1.51	1.51	1.51	1.51	1.50	1.50	1.50	1.50
3,700	1.62	1.61	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.59	1.59	1.59	1.59	1.59	1.58	1.58	1.58	1.58	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.56	1.56	1.55	1.55	1.55	1.55	1.54	1.54	1.54
3,800	1.66	1.66	1.66	1.65	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.63	1.63	1.63	1.63	1.62	1.62	1.62	1.62	1.61	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.59	1.59	1.59	1.59	1.59	1.58	1.58
3,900	1.70	1.70	1.70	1.70	1.69	1.69	1.69	1.69	1.68	1.68	1.68	1.68	1.67	1.67	1.67	1.67	1.66	1.66	1.66	1.66	1.65	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.63	1.63	1.63	1.63	1.63	1.62
4,000	1.75	1.75	1.74	1.74	1.74	1.73	1.73	1.73	1.73	1.72	1.72	1.72	1.72	1.71	1.71	1.71	1.71	1.70	1.70	1.70	1.70	1.69	1.69	1.69	1.69	1.68	1.68	1.68	1.68	1.67	1.67	1.67	1.67	1.66
4,100	1.79	1.79	1.79	1.78	1.78	1.78	1.78	1.77	1.77	1.77	1.76	1.76	1.76	1.76	1.75	1.75	1.75	1.75	1.74	1.74	1.74	1.74	1.73	1.73	1.73	1.73	1.72	1.72	1.72	1.72	1.71	1.71	1.71	1.71
4,200	1.84	1.83	1.83	1.83	1.82	1.82	1.82	1.82	1.81	1.81	1.81	1.80	1.80	1.80	1.80	1.79	1.79	1.79	1.79	1.78	1.78	1.78	1.78	1.77	1.77	1.77	1.77	1.76	1.76	1.76	1.76	1.75	1.75	1.75
4,300	1.88	1.88	1.87	1.87	1.87	1.86	1.86	1.86	1.86	1.85	1.85	1.85	1.84	1.84	1.84	1.84	1.83	1.83	1.83	1.83	1.82	1.82	1.82	1.82	1.81	1.81	1.81	1.80	1.80	1.80	1.80	1.79	1.79	1.79
4,400	1.92	1.92	1.92	1.91	1.91	1.91	1.91	1.90	1.90	1.90	1.89	1.89	1.89	1.89	1.88	1.88	1.88	1.87	1.87	1.87	1.87	1.86	1.86	1.86	1.85	1.85	1.85	1.85	1.84	1.84	1.84	1.84	1.83	1.83
4,500	1.97	1.96	1.96	1.96	1.95	1.95	1.95	1.95	1.94	1.94	1.94	1.93	1.93	1.93	1.92	1.92	1.92	1.92	1.91	1.91	1.91	1.91	1.90	1.90	1.90	1.89	1.89	1.89	1.89	1.88	1.88	1.88	1.88	1.87
4,600	2.01	2.01	2.00	2.00	2.00	2.00	1.99	1.99	1.99	1.98	1.98	1.98	1.97	1.97	1.97	1.96	1.96	1.96	1.96	1.95	1.95	1.95	1.94	1.94	1.94	1.94	1.93	1.93	1.93	1.93	1.92	1.92	1.92	1.91
4,700	2.05	2.05	2.05	2.04	2.04	2.04	2.04	2.03	2.03	2.03	2.02	2.02	2.02	2.01	2.01	2.01	2.00	2.00	2.00	2.00	1.99	1.99	1.99	1.98	1.98	1.98	1.98	1.97	1.97	1.97	1.96	1.96	1.96	1.96
4,800	2.10	2.10	2.09	2.09	2.09	2.08	2.08	2.08	2.07	2.07	2.07	2.06	2.06	2.06	2.05	2.05	2.05	2.04	2.04	2.04	2.04	2.03	2.03	2.03	2.02	2.02	2.02	2.01	2.01	2.01	2.01	2.00	2.00	2.00
4,900	2.14	2.14	2.14	2.13	2.13	2.13	2.12	2.12	2.12	2.11	2.11	2.11	2.10	2.10	2.10	2.09	2.09	2.09	2.08	2.08	2.08	2.07	2.07	2.07	2.07	2.06	2.06	2.06	2.05	2.05	2.05	2.05	2.04	2.04
5,000	2.19	2.18	2.18	2.18	2.17	2.17	2.17	2.16	2.16	2.16	2.15	2.15	2.15	2.14	2.14	2.14	2.13	2.13	2.13	2.12	2.12	2.12	2.11	2.11	2.11	2.10	2.10	2.10	2.10	2.09	2.09	2.09	2.08	2.08
5,200	2.27	2.27	2.27	2.26	2.26	2.26	2.25	2.25	2.24	2.24	2.24	2.23	2.23	2.23	2.22	2.22	2.22	2.21	2.21	2.21	2.20	2.20	2.20	2.20	2.19	2.19	2.19	2.18	2.18	2.18	2.17	2.17	2.17	2.16
5,400	2.36	2.36	2.35	2.35	2.35	2.34	2.34	2.33	2.33	2.33	2.32	2.32	2.32	2.31	2.31	2.31	2.30	2.30	2.30	2.29	2.29	2.29	2.28	2.28	2.28	2.27	2.27	2.27	2.26	2.26	2.26	2.25	2.25	2.25
5,600	2.45	2.44	2.44	2.44	2.43	2.43	2.43	2.42	2.42	2.41	2.41	2.41	2.40	2.40	2.40	2.39	2.39	2.39	2.38	2.38	2.37	2.37	2.37	2.36	2.36	2.36	2.35	2.35	2.35	2.34	2.34	2.34	2.33	2.33
5,800	2.54	2.53	2.53	2.52	2.52	2.52	2.51	2.51	2.50	2.50	2.50	2.49	2.49	2.49	2.48	2.48	2.47	2.47	2.47	2.46	2.46	2.46	2.45	2.45	2.45	2.44	2.44	2.43	2.43	2.43	2.42	2.42	2.42	2.41
6,000	2.62	2.62	2.61	2.61	2.61	2.60	2.60	2.59	2.59	2.59	2.58	2.58	2.57	2.57	2.57	2.56	2.56	2.56	2.55	2.55	2.54	2.54	2.54	2.53	2.53	2.53	2.52	2.52	2.52	2.51	2.51	2.50	2.50	2.50
6,200	2.71	2.71	2.70	2.70	2.69	2.69	2.69	2.68	2.68	2.67	2.67	2.66	2.66	2.66	2.65	2.65	2.64	2.64	2.64	2.63	2.63	2.63	2.62	2.62	2.61	2.61	2.61	2.60	2.60	2.60	2.59	2.59	2.58	2.58
6,400	2.80	2.79	2.79	2.79	2.78	2.78	2.77	2.77	2.76	2.76	2.75	2.75	2.75	2.74	2.74	2.73	2.73	2.73	2.72	2.72	2.71	2.71	2.71	2.70	2.70	2.69	2.69	2.69	2.68	2.68	2.68	2.67	2.67	2.66
6,600	2.89	2.88	2.88	2.87	2.87	2.86	2.86	2.85	2.85	2.85	2.84	2.84	2.83	2.83	2.82	2.82	2.82	2.81	2.81	2.80	2.80	2.79	2.79	2.79	2.78	2.78	2.77	2.77	2.77	2.76	2.76	2.76	2.75	2.75
6,800	2.97	2.97	2.96	2.96	2.95	2.95	2.95	2.94	2.94	2.93	2.93	2.92	2.92	2.91	2.91	2.91	2.90	2.90	2.89	2.89	2.88	2.88	2.88	2.87	2.87	2.86	2.86	2.85	2.85	2.85	2.84	2.84	2.83	2.83
7,000	3.06	3.06	3.05	3.05	3.04	3.04	3.03	3.03	3.02	3.02	3.01	3.01	3.00	3.00	3.00	2.99	2.99	2.98	2.98	2.97	2.97	2.96	2.96	2.96	2.95	2.95	2.94	2.94	2.93	2.93	2.93	2.92	2.92	2.91
7,200	3.15	3.14	3.14	3.13	3.13	3.12	3.12	3.11	3.11	3.10	3.10	3.09	3.09	3.09	3.08	3.08	3.07	3.07	3.06	3.06	3.05	3.05	3.04	3.04	3.04	3.03	3.03	3.02	3.02	3.01	3.01	3.01	3.00	3.00
7,400	3.24	3.23	3.23	3.22	3.22	3.21	3.21	3.20	3.20	3.19	3.19	3.18	3.18	3.17	3.17	3.16	3.16	3.15	3.15	3.14	3.14	3.13	3.13	3.12	3.12	3.12	3.11	3.11	3.10	3.10	3.09	3.09	3.09	3.08
7,600	3.32	3.32	3.31	3.31	3.30	3.30	3.29	3.29	3.28	3.28	3.27	3.27	3.26	3.26	3.25	3.25	3.24	3.24	3.23	3.23	3.22	3.22	3.21	3.21	3.20	3.20	3.20	3.19	3.19	3.18	3.18	3.17	3.17	3.16
7,800	3.41	3.41	3.40	3.39	3.39	3.38	3.38	3.37	3.37	3.36	3.36	3.35	3.35	3.34	3.34	3.33	3.33	3.32	3.32	3.31	3.31	3.30	3.30	3.29	3.29	3.28	3.28	3.27	3.27	3.27	3.26	3.26	3.25	3.25
8,000	3.50	3.49	3.49	3.48	3.48	3.47	3.47	3.46	3.45	3.45	3.44	3.44	3.43	3.43	3.42	3.42	3.41	3.41	3.40	3.40	3.39	3.39	3.38	3.38	3.37	3.37	3.36	3.36	3.35	3.35	3.34	3.34	3.34	3.33
8,200	3.59	3.58	3.57	3.57	3.56	3.56	3.55	3.55	3.54	3.54	3.53	3.52	3.52	3.51	3.51	3.50	3.50	3.49	3.49	3.48	3.48	3.47	3.47	3.46	3.46	3.45	3.45	3.44	3.44	3.43	3.43	3.42	3.42	3.41
8,400	3.67	3.67	3.66	3.66	3.65	3.64	3.64	3.63	3.63	3.62	3.62	3.61	3.61	3.60	3.59	3.59	3.58	3.58	3.57	3.57	3.56	3.56	3.55	3.55	3.54	3.54	3.53	3.53	3.52	3.52	3.51	3.51	3.50	3.50
8,600	3.76	3.76	3.75	3.74	3.74	3.73	3.73	3.72	3.71	3.71	3.70	3.70	3.69	3.69	3.68	3.67	3.67	3.66	3.66	3.65	3.65	3.64	3.64	3.63	3.63	3.62	3.62	3.61	3.61	3.60	3.60	3.59	3.59	3.58
8,800	3.85	3.84	3.84	3.83	3.82	3.82	3.81	3.81	3.80	3.79	3.79	3.78	3.78	3.77	3.77	3.76	3.75	3.75	3.74	3.74	3.73	3.73	3.72	3.72	3.71	3.71	3.70	3.69	3.69	3.68	3.68	3.67	3.67	3.66
9,000	3.94	3.93	3.92	3.92	3.91	3.91	3.90	3.89	3.89	3.88	3.88	3.87	3.86	3.86	3.85	3.85	3.84	3.83	3.83	3.82	3.82	3.81	3.81	3.80	3.80	3.79	3.78	3.78	3.77	3.77	3.76	3.76	3.75	3.75
9,200	4.02	4.02	4.01	4.01	4.00	3.99	3.99	3.98	3.97	3.97	3.96	3.96	3.95	3.94	3.94	3.93	3.93	3.92	3.91	3.91	3.90	3.90	3.89	3.89	3.88	3.87	3.87	3.86	3.86	3.85	3.85	3.84	3.84	3.83
9,400	4.11	4.11	4.10	4.09	4.09	4.08	4.07	4.07	4.06	4.05	4.05	4.04	4.04	4.03	4.02	4.02	4.01	4.00	4.00	3.99	3.99	3.98	3.98	3.97	3.96	3.96	3.95	3.95	3.94	3.94	3.93	3.92	3.92	3.91
9,600	4.20	4.19	4.19	4.18	4.17	4.17	4.16	4.15	4.15	4.14	4.13	4.13	4.12	4.11	4.11	4.10	4.10	4.09	4.08	4.08	4.07	4.07	4.06	4.05	4.05	4.04	4.04	4.03	4.03	4.02	4.01	4.01	4.00	4.00
9,800	4.29	4.28	4.27	4.27	4.26	4.25	4.25	4.24	4.23	4.23	4.22	4.21	4.21	4.20	4.19	4.19	4.18	4.18	4.17	4.16	4.16	4.15	4.14	4.14	4.13	4.13	4.12	4.12	4.11	4.10	4.10	4.09	4.09	4.08
10,000	4.38	4.37	4.36	4.35	4.35	4.34	4.33	4.33	4.32	4.31	4.31	4.30	4.29	4.29	4.28	4.27	4.27	4.26	4.25	4.25	4.24	4.24	4.23	4.22	4.22	4.21	4.21	4.20	4.19	4.19	4.18	4.18	4.17	4.16
10,200	4.46	4.46	4.45	4.44	4.43	4.43	4.42	4.41	4.41	4.40	4.39	4.39	4.38	4.37	4.37	4.36	4.35	4.35	4.34	4.33	4.33	4.32	4.31	4.31	4.30	4.30	4.29	4.28	4.28	4.27	4.27	4.26	4.25	4.25
10,400	4.55	4.54	4.54	4.53	4.52	4.51	4.51	4.50	4.49	4.49	4.48	4.47	4.46	4.46	4.45	4.44	4.44	4.43	4.42	4.42	4.41	4.41	4.40	4.39	4.39	4.38	4.37	4.37	4.36	4.35	4.35	4.34	4.34	4.33
10,600	4.64	4.63	4.62	4.62	4.61	4.60	4.59	4.59	4.58	4.57	4.56	4.56	4.55	4.54	4.54	4.53	4.52	4.52	4.51	4.50	4.50	4.49	4.48	4.48	4.47	4.46	4.46	4.45	4.44	4.44	4.43	4.43	4.42	4.41
10,800	4.73	4.72	4.71	4.70	4.70	4.69	4.68	4.67	4.67	4.66	4.65	4.64	4.64	4.63	4.62	4.62	4.61	4.60	4.60	4.59	4.58	4.57	4.57	4.56	4.56	4.55	4.54	4.54	4.53	4.52	4.52	4.51	4.50	4.50
11,000	4.81	4.81	4.80	4.79	4.78	4.77	4.77	4.76	4.75	4.74	4.74	4.73	4.72	4.72	4.71	4.70	4.69	4.69	4.68	4.67	4.67	4.66	4.65	4.65	4.64	4.63	4.63	4.62	4.61	4.61	4.60	4.59	4.59	4.58
11,200	4.90	4.89	4.89	4.88	4.87	4.86	4.85	4.85	4.84	4.83	4.82	4.82	4.81	4.80	4.79	4.79	4.78	4.77	4.77	4.76	4.75	4.74	4.74	4.73	4.72	4.72	4.71	4.70	4.70	4.69	4.68	4.68	4.67	4.66
11,400	4.99	4.98	4.97	4.96	4.96	4.95	4.94	4.93	4.93	4.92	4.91	4.90	4.89	4.89	4.88	4.87	4.87	4.86	4.85	4.84	4.84	4.83	4.82	4.82	4.81	4.80	4.79	4.79	4.78	4.77	4.77	4.76	4.75	4.75
11,600	5.08	5.07	5.06	5.05	5.04	5.04	5.03	5.02	5.01	5.00	5.00	4.99	4.98	4.97	4.97	4.96	4.95	4.94	4.94	4.93	4.92	4.91	4.91	4.90	4.89	4.89	4.88	4.87	4.86	4.86	4.85	4.84	4.84	4.83
11,800	5.16	5.16	5.15	5.14	5.13	5.12	5.11	5.11	5.10	5.09	5.08	5.07	5.07	5.06	5.05	5.04	5.04	5.03	5.02	5.01	5.01	5.00	4.99	4.98	4.98	4.97	4.96	4.96	4.95	4.94	4.93	4.93	4.92	4.91
12,000	5.25	5.24	5.23	5.23	5.22	5.21	5.20	5.19	5.18	5.18	5.17	5.16	5.15	5.14	5.14	5.13	5.12	5.11	5.11	5.10	5.09	5.08	5.08	5.07	5.06	5.05	5.05	5.04	5.03	5.03	5.02	5.01	5.00	5.00
12,200	5.34	5.33	5.32	5.31	5.31	5.30	5.29	5.28	5.27	5.26	5.26	5.25	5.24	5.23	5.22	5.21	5.21	5.20	5.19	5.18	5.18	5.17	5.16	5.15	5.15	5.14	5.13	5.12	5.12	5.11	5.10	5.09	5.09	5.08
12,400	5.43	5.42	5.41	5.40	5.39	5.38	5.38	5.37	5.36	5.35	5.34	5.33	5.32	5.32	5.31	5.30	5.29	5.28	5.28	5.27	5.26	5.25	5.25	5.24	5.23	5.22	5.22	5.21	5.20	5.19	5.19	5.18	5.17	5.16
12,600	5.52	5.51	5.50	5.49	5.48	5.47	5.46	5.45	5.44	5.44	5.43	5.42	5.41	5.40	5.39	5.39	5.38	5.37	5.36	5.35	5.35	5.34	5.33	5.32	5.31	5.31	5.30	5.29	5.28	5.28	5.27	5.26	5.25	5.25
12,800	5.60	5.59	5.58	5.58	5.57	5.56	5.55	5.54	5.53	5.52	5.51	5.51	5.50	5.49	5.48	5.47	5.46	5.46	5.45	5.44	5.43	5.42	5.42	5.41	5.40	5.39	5.38	5.38	5.37	5.36	5.35	5.35	5.34	5.33
13,000	5.69	5.68	5.67	5.66	5.65	5.64	5.64	5.63	5.62	5.61	5.60	5.59	5.58	5.57	5.57	5.56	5.55	5.54	5.53	5.52	5.52	5.51	5.50	5.49	5.48	5.48	5.47	5.46	5.45	5.44	5.44	5.43	5.42	5.41
13,200	5.78	5.77	5.76	5.75	5.74	5.73	5.72	5.71	5.70	5.70	5.69	5.68	5.67	5.66	5.65	5.64	5.63	5.63	5.62	5.61	5.60	5.59	5.58	5.58	5.57	5.56	5.55	5.54	5.54	5.53	5.52	5.51	5.51	5.50
13,400	5.87	5.86	5.85	5.84	5.83	5.82	5.81	5.80	5.79	5.78	5.77	5.76	5.75	5.75	5.74	5.73	5.72	5.71	5.70	5.69	5.69	5.68	5.67	5.66	5.65	5.64	5.64	5.63	5.62	5.61	5.60	5.60	5.59	5.58
13,600	5.95	5.94	5.93	5.92	5.92	5.91	5.90	5.89	5.88	5.87	5.86	5.85	5.84	5.83	5.82	5.81	5.81	5.80	5.79	5.78	5.77	5.76	5.75	5.75	5.74	5.73	5.72	5.71	5.70	5.70	5.69	5.68	5.67	5.66
13,800	6.04	6.03	6.02	6.01	6.00	5.99	5.98	5.97	5.96	5.95	5.95	5.94	5.93	5.92	5.91	5.90	5.89	5.88	5.87	5.86	5.86	5.85	5.84	5.83	5.82	5.81	5.80	5.80	5.79	5.78	5.77	5.76	5.76	5.75
14,000	6.13	6.12	6.11	6.10	6.09	6.08	6.07	6.06	6.05	6.04	6.03	6.02	6.01	6.00	5.99	5.99	5.98	5.97	5.96	5.95	5.94	5.93	5.92	5.91	5.91	5.90	5.89	5.88	5.87	5.86	5.86	5.85	5.84	5.83
14,200	6.22	6.21	6.20	6.19	6.18	6.17	6.16	6.15	6.14	6.13	6.12	6.11	6.10	6.09	6.08	6.07	6.06	6.05	6.04	6.03	6.03	6.02	6.01	6.00	5.99	5.98	5.97	5.96	5.96	5.95	5.94	5.93	5.92	5.91
14,400	6.31	6.29	6.28	6.27	6.26	6.25	6.24	6.23	6.22	6.21	6.20	6.19	6.19	6.18	6.17	6.16	6.15	6.14	6.13	6.12	6.11	6.10	6.09	6.08	6.08	6.07	6.06	6.05	6.04	6.03	6.02	6.01	6.01	6.00
14,600	6.39	6.38	6.37	6.36	6.35	6.34	6.33	6.32	6.31	6.30	6.29	6.28	6.27	6.26	6.25	6.24	6.23	6.22	6.21	6.21	6.20	6.19	6.18	6.17	6.16	6.15	6.14	6.13	6.12	6.12	6.11	6.10	6.09	6.08
14,800	6.48	6.47	6.46	6.45	6.44	6.43	6.42	6.41	6.40	6.39	6.38	6.37	6.36	6.35	6.34	6.33	6.32	6.31	6.30	6.29	6.28	6.27	6.26	6.25	6.24	6.24	6.23	6.22	6.21	6.20	6.19	6.18	6.17	6.16
15,000	6.57	6.56	6.55	6.54	6.53	6.52	6.50	6.49	6.48	6.47	6.46	6.45	6.44	6.43	6.42	6.41	6.40	6.39	6.38	6.38	6.37	6.36	6.35	6.34	6.33	6.32	6.31	6.30	6.29	6.28	6.27	6.27	6.26	6.25
15,200	6.66	6.65	6.63	6.62	6.61	6.60	6.59	6.58	6.57	6.56	6.55	6.54	6.53	6.52	6.51	6.50	6.49	6.48	6.47	6.46	6.45	6.44	6.43	6.42	6.41	6.40	6.39	6.39	6.38	6.37	6.36	6.35	6.34	6.33
15,400	6.74	6.73	6.72	6.71	6.70	6.69	6.68	6.67	6.66	6.65	6.64	6.63	6.62	6.61	6.60	6.59	6.58	6.57	6.56	6.55	6.54	6.53	6.52	6.51	6.50	6.49	6.48	6.47	6.46	6.45	6.44	6.43	6.42	6.41
15,600	6.83	6.82	6.81	6.80	6.79	6.78	6.77	6.75	6.74	6.73	6.72	6.71	6.70	6.69	6.68	6.67	6.66	6.65	6.64	6.63	6.62	6.61	6.60	6.59	6.58	6.57	6.56	6.55	6.54	6.53	6.53	6.52	6.51	6.50
15,800	6.92	6.91	6.90	6.89	6.87	6.86	6.85	6.84	6.83	6.82	6.81	6.80	6.79	6.78	6.77	6.76	6.75	6.74	6.73	6.72	6.71	6.70	6.69	6.68	6.67	6.66	6.65	6.64	6.63	6.62	6.61	6.60	6.59	6.58
16,000	7.01	7.00	6.98	6.97	6.96	6.95	6.94	6.93	6.92	6.91	6.90	6.88	6.87	6.86	6.85	6.84	6.83	6.82	6.81	6.80	6.79	6.78	6.77	6.76	6.75	6.74	6.73	6.72	6.71	6.70	6.69	6.68	6.67	6.67
16,200	7.10	7.08	7.07	7.06	7.05	7.04	7.03	7.02	7.00	6.99	6.98	6.97	6.96	6.95	6.94	6.93	6.92	6.91	6.90	6.89	6.88	6.87	6.86	6.85	6.84	6.83	6.82	6.81	6.80	6.79	6.78	6.77	6.76	6.75
16,400	7.18	7.17	7.16	7.15	7.14	7.12	7.11	7.10	7.09	7.08	7.07	7.06	7.05	7.04	7.02	7.01	7.00	6.99	6.98	6.97	6.96	6.95	6.94	6.93	6.92	6.91	6.90	6.89	6.88	6.87	6.86	6.85	6.84	6.83
16,600	7.27	7.26	7.25	7.24	7.22	7.21	7.20	7.19	7.18	7.17	7.15	7.14	7.13	7.12	7.11	7.10	7.09	7.08	7.07	7.06	7.05	7.04	7.03	7.01	7.00	6.99	6.98	6.97	6.96	6.95	6.94	6.93	6.92	6.92
16,800	7.36	7.35	7.33	7.32	7.31	7.30	7.29	7.28	7.26	7.25	7.24	7.23	7.22	7.21	7.20	7.19	7.17	7.16	7.15	7.14	7.13	7.12	7.11	7.10	7.09	7.08	7.07	7.06	7.05	7.04	7.03	7.02	7.01	7.00
17,000	7.45	7.43	7.42	7.41	7.40	7.39	7.37	7.36	7.35	7.34	7.33	7.32	7.30	7.29	7.28	7.27	7.26	7.25	7.24	7.23	7.22	7.21	7.19	7.18	7.17	7.16	7.15	7.14	7.13	7.12	7.11	7.10	7.09	7.08
17,200	7.53	7.52	7.51	7.50	7.49	7.47	7.46	7.45	7.44	7.43	7.41	7.40	7.39	7.38	7.37	7.36	7.35	7.33	7.32	7.31	7.30	7.29	7.28	7.27	7.26	7.25	7.24	7.23	7.22	7.21	7.20	7.19	7.18	7.17
17,400	7.62	7.61	7.60	7.59	7.57	7.56	7.55	7.54	7.52	7.51	7.50	7.49	7.48	7.47	7.45	7.44	7.43	7.42	7.41	7.40	7.39	7.38	7.36	7.35	7.34	7.33	7.32	7.31	7.30	7.29	7.28	7.27	7.26	7.25
17,600	7.71	7.70	7.69	7.67	7.66	7.65	7.64	7.62	7.61	7.60	7.59	7.57	7.56	7.55	7.54	7.53	7.52	7.51	7.49	7.48	7.47	7.46	7.45	7.44	7.43	7.42	7.41	7.39	7.38	7.37	7.36	7.35	7.34	7.33
17,800	7.80	7.79	7.77	7.76	7.75	7.73	7.72	7.71	7.70	7.69	7.67	7.66	7.65	7.64	7.63	7.61	7.60	7.59	7.58	7.57	7.56	7.54	7.53	7.52	7.51	7.50	7.49	7.48	7.47	7.46	7.45	7.44	7.43	7.42
18,000	7.89	7.87	7.86	7.85	7.83	7.82	7.81	7.80	7.78	7.77	7.76	7.75	7.74	7.72	7.71	7.70	7.69	7.68	7.66	7.65	7.64	7.63	7.62	7.61	7.60	7.59	7.57	7.56	7.55	7.54	7.53	7.52	7.51	7.50
18,200	7.97	7.96	7.95	7.93	7.92	7.91	7.90	7.88	7.87	7.86	7.85	7.83	7.82	7.81	7.80	7.79	7.77	7.76	7.75	7.74	7.73	7.71	7.70	7.69	7.68	7.67	7.66	7.65	7.64	7.63	7.61	7.60	7.59	7.58
18,400	8.06	8.05	8.04	8.02	8.01	8.00	7.98	7.97	7.96	7.95	7.93	7.92	7.91	7.90	7.88	7.87	7.86	7.85	7.84	7.82	7.81	7.80	7.79	7.78	7.77	7.75	7.74	7.73	7.72	7.71	7.70	7.69	7.68	7.67
18,600	8.15	8.14	8.12	8.11	8.10	8.08	8.07	8.06	8.04	8.03	8.02	8.01	7.99	7.98	7.97	7.96	7.94	7.93	7.92	7.91	7.90	7.88	7.87	7.86	7.85	7.84	7.83	7.82	7.80	7.79	7.78	7.77	7.76	7.75
18,800	8.24	8.22	8.21	8.20	8.18	8.17	8.16	8.14	8.13	8.12	8.11	8.09	8.08	8.07	8.05	8.04	8.03	8.02	8.01	7.99	7.98	7.97	7.96	7.95	7.93	7.92	7.91	7.90	7.89	7.88	7.87	7.85	7.84	7.83
19,000	8.33	8.31	8.30	8.28	8.27	8.26	8.24	8.23	8.22	8.20	8.19	8.18	8.17	8.15	8.14	8.13	8.12	8.10	8.09	8.08	8.07	8.05	8.04	8.03	8.02	8.01	8.00	7.98	7.97	7.96	7.95	7.94	7.93	7.92
19,200	8.41	8.40	8.39	8.37	8.36	8.34	8.33	8.32	8.30	8.29	8.28	8.27	8.25	8.24	8.23	8.21	8.20	8.19	8.18	8.16	8.15	8.14	8.13	8.12	8.10	8.09	8.08	8.07	8.06	8.04	8.03	8.02	8.01	8.00
19,400	8.50	8.49	8.47	8.46	8.45	8.43	8.42	8.40	8.39	8.38	8.36	8.35	8.34	8.33	8.31	8.30	8.29	8.27	8.26	8.25	8.24	8.22	8.21	8.20	8.19	8.18	8.16	8.15	8.14	8.13	8.12	8.11	8.09	8.08
19,600	8.59	8.58	8.56	8.55	8.53	8.52	8.51	8.49	8.48	8.46	8.45	8.44	8.42	8.41	8.40	8.39	8.37	8.36	8.35	8.33	8.32	8.31	8.30	8.28	8.27	8.26	8.25	8.24	8.22	8.21	8.20	8.19	8.18	8.17
19,800	8.68	8.66	8.65	8.63	8.62	8.61	8.59	8.58	8.56	8.55	8.54	8.52	8.51	8.50	8.48	8.47	8.46	8.45	8.43	8.42	8.41	8.39	8.38	8.37	8.36	8.35	8.33	8.32	8.31	8.30	8.28	8.27	8.26	8.25
20,000	8.77	8.75	8.74	8.72	8.71	8.69	8.68	8.67	8.65	8.64	8.62	8.61	8.60	8.58	8.57	8.56	8.54	8.53	8.52	8.50	8.49	8.48	8.47	8.45	8.44	8.43	8.42	8.40	8.39	8.38	8.37	8.36	8.35	8.33
20,200	8.85	8.84	8.82	8.81	8.80	8.78	8.77	8.75	8.74	8.72	8.71	8.70	8.68	8.67	8.66	8.64	8.63	8.62	8.60	8.59	8.58	8.56	8.55	8.54	8.53	8.51	8.50	8.49	8.48	8.46	8.45	8.44	8.43	8.42
20,400	8.94	8.93	8.91	8.90	8.88	8.87	8.85	8.84	8.83	8.81	8.80	8.78	8.77	8.76	8.74	8.73	8.72	8.70	8.69	8.68	8.66	8.65	8.64	8.62	8.61	8.60	8.59	8.57	8.56	8.55	8.54	8.52	8.51	8.50
20,600	9.03	9.01	9.00	8.98	8.97	8.96	8.94	8.93	8.91	8.90	8.88	8.87	8.86	8.84	8.83	8.81	8.80	8.79	8.77	8.76	8.75	8.73	8.72	8.71	8.70	8.68	8.67	8.66	8.64	8.63	8.62	8.61	8.60	8.58
20,800	9.12	9.10	9.09	9.07	9.06	9.04	9.03	9.01	9.00	8.98	8.97	8.96	8.94	8.93	8.91	8.90	8.89	8.87	8.86	8.85	8.83	8.82	8.81	8.79	8.78	8.77	8.75	8.74	8.73	8.72	8.70	8.69	8.68	8.67
21,000	9.21	9.19	9.18	9.16	9.14	9.13	9.12	9.10	9.09	9.07	9.06	9.04	9.03	9.01	9.00	8.99	8.97	8.96	8.94	8.93	8.92	8.90	8.89	8.88	8.86	8.85	8.84	8.83	8.81	8.80	8.79	8.78	8.76	8.75
21,200	9.29	9.28	9.26	9.25	9.23	9.22	9.20	9.19	9.17	9.16	9.14	9.13	9.11	9.10	9.09	9.07	9.06	9.04	9.03	9.02	9.00	8.99	8.98	8.96	8.95	8.94	8.92	8.91	8.90	8.88	8.87	8.86	8.85	8.83
21,400	9.38	9.37	9.35	9.34	9.32	9.30	9.29	9.27	9.26	9.24	9.23	9.22	9.20	9.19	9.17	9.16	9.14	9.13	9.12	9.10	9.09	9.07	9.06	9.05	9.03	9.02	9.01	8.99	8.98	8.97	8.96	8.94	8.93	8.92
21,600	9.47	9.45	9.44	9.42	9.41	9.39	9.38	9.36	9.35	9.33	9.32	9.30	9.29	9.27	9.26	9.24	9.23	9.22	9.20	9.19	9.17	9.16	9.15	9.13	9.12	9.11	9.09	9.08	9.07	9.05	9.04	9.03	9.01	9.00
21,800	9.56	9.54	9.53	9.51	9.49	9.48	9.46	9.45	9.43	9.42	9.40	9.39	9.37	9.36	9.34	9.33	9.31	9.30	9.29	9.27	9.26	9.24	9.23	9.22	9.20	9.19	9.18	9.16	9.15	9.14	9.12	9.11	9.10	9.08
22,000	9.65	9.63	9.61	9.60	9.58	9.57	9.55	9.54	9.52	9.50	9.49	9.47	9.46	9.44	9.43	9.42	9.40	9.39	9.37	9.36	9.34	9.33	9.32	9.30	9.29	9.27	9.26	9.25	9.23	9.22	9.21	9.19	9.18	9.17
22,200	9.73	9.72	9.70	9.69	9.67	9.65	9.64	9.62	9.61	9.59	9.58	9.56	9.55	9.53	9.52	9.50	9.49	9.47	9.46	9.44	9.43	9.41	9.40	9.39	9.37	9.36	9.34	9.33	9.32	9.30	9.29	9.28	9.26	9.25
22,400	9.82	9.81	9.79	9.77	9.76	9.74	9.72	9.71	9.69	9.68	9.66	9.65	9.63	9.62	9.60	9.59	9.57	9.56	9.54	9.53	9.51	9.50	9.49	9.47	9.46	9.44	9.43	9.42	9.40	9.39	9.37	9.36	9.35	9.34
22,600	9.91	9.89	9.88	9.86	9.84	9.83	9.81	9.80	9.78	9.76	9.75	9.73	9.72	9.70	9.69	9.67	9.66	9.64	9.63	9.61	9.60	9.58	9.57	9.56	9.54	9.53	9.51	9.50	9.49	9.47	9.46	9.45	9.43	9.42
22,800	10.00	9.98	9.96	9.95	9.93	9.92	9.90	9.88	9.87	9.85	9.84	9.82	9.80	9.79	9.77	9.76	9.74	9.73	9.71	9.70	9.68	9.67	9.65	9.64	9.63	9.61	9.60	9.58	9.57	9.56	9.54	9.53	9.52	9.50
23,000	10.09	10.07	10.05	10.04	10.02	10.00	9.99	9.97	9.95	9.94	9.92	9.91	9.89	9.87	9.86	9.84	9.83	9.81	9.80	9.78	9.77	9.75	9.74	9.73	9.71	9.70	9.68	9.67	9.65	9.64	9.63	9.61	9.60	9.59
23,200	10.18	10.16	10.14	10.12	10.11	10.09	10.07	10.06	10.04	10.02	10.01	9.99	9.98	9.96	9.95	9.93	9.91	9.90	9.88	9.87	9.85	9.84	9.82	9.81	9.80	9.78	9.77	9.75	9.74	9.72	9.71	9.70	9.68	9.67
23,400	10.26	10.25	10.23	10.21	10.19	10.18	10.16	10.14	10.13	10.11	10.10	10.08	10.06	10.05	10.03	10.02	10.00	9.98	9.97	9.95	9.94	9.92	9.91	9.89	9.88	9.87	9.85	9.84	9.82	9.81	9.79	9.78	9.77	9.75
23,600	10.35	10.33	10.32	10.30	10.28	10.26	10.25	10.23	10.21	10.20	10.18	10.17	10.15	10.13	10.12	10.10	10.09	10.07	10.06	10.04	10.02	10.01	9.99	9.98	9.96	9.95	9.94	9.92	9.91	9.89	9.88	9.86	9.85	9.84
23,800	10.44	10.42	10.40	10.39	10.37	10.35	10.34	10.32	10.30	10.28	10.27	10.25	10.24	10.22	10.20	10.19	10.17	10.16	10.14	10.13	10.11	10.09	10.08	10.06	10.05	10.03	10.02	10.01	9.99	9.98	9.96	9.95	9.93	9.92
24,000	10.53	10.51	10.49	10.47	10.46	10.44	10.42	10.41	10.39	10.37	10.35	10.34	10.32	10.31	10.29	10.27	10.26	10.24	10.23	10.21	10.19	10.18	10.16	10.15	10.13	10.12	10.10	10.09	10.07	10.06	10.05	10.03	10.02	10.00
24,200	10.62	10.60	10.58	10.56	10.54	10.53	10.51	10.49	10.48	10.46	10.44	10.42	10.41	10.39	10.38	10.36	10.34	10.33	10.31	10.30	10.28	10.26	10.25	10.23	10.22	10.20	10.19	10.17	10.16	10.14	10.13	10.12	10.10	10.09
24,400	10.70	10.69	10.67	10.65	10.63	10.61	10.60	10.58	10.56	10.54	10.53	10.51	10.49	10.48	10.46	10.45	10.43	10.41	10.40	10.38	10.37	10.35	10.33	10.32	10.30	10.29	10.27	10.26	10.24	10.23	10.21	10.20	10.18	10.17
24,600	10.79	10.77	10.76	10.74	10.72	10.70	10.68	10.67	10.65	10.63	10.61	10.60	10.58	10.56	10.55	10.53	10.51	10.50	10.48	10.47	10.45	10.43	10.42	10.40	10.39	10.37	10.36	10.34	10.33	10.31	10.30	10.28	10.27	10.25
24,800	10.88	10.86	10.84	10.82	10.81	10.79	10.77	10.75	10.74	10.72	10.70	10.68	10.67	10.65	10.63	10.62	10.60	10.58	10.57	10.55	10.54	10.52	10.50	10.49	10.47	10.46	10.44	10.43	10.41	10.40	10.38	10.37	10.35	10.34
25,000	10.97	10.95	10.93	10.91	10.89	10.88	10.86	10.84	10.82	10.81	10.79	10.77	10.75	10.74	10.72	10.70	10.69	10.67	10.65	10.64	10.62	10.60	10.59	10.57	10.56	10.54	10.53	10.51	10.50	10.48	10.47	10.45	10.44	10.42
25,200	11.07	11.04	11.02	11.00	10.98	10.96	10.95	10.93	10.91	10.89	10.87	10.86	10.84	10.82	10.81	10.79	10.77	10.76	10.74	10.72	10.71	10.69	10.67	10.66	10.64	10.63	10.61	10.60	10.58	10.56	10.55	10.53	10.52	10.50
25,400	11.17	11.15	11.12	11.10	11.08	11.06	11.03	11.01	11.00	10.98	10.96	10.94	10.93	10.91	10.89	10.87	10.86	10.84	10.82	10.81	10.79	10.77	10.76	10.74	10.73	10.71	10.69	10.68	10.66	10.65	10.63	10.62	10.60	10.59
25,600	11.27	11.25	11.22	11.20	11.17	11.15	11.13	11.10	11.08	11.07	11.05	11.03	11.01	10.99	10.98	10.96	10.94	10.93	10.91	10.89	10.88	10.86	10.84	10.83	10.81	10.80	10.78	10.76	10.75	10.73	10.72	10.70	10.69	10.67
25,800	11.38	11.35	11.32	11.29	11.27	11.25	11.22	11.19	11.17	11.15	11.13	11.12	11.10	11.08	11.06	11.05	11.03	11.01	11.00	10.98	10.96	10.94	10.93	10.91	10.90	10.88	10.86	10.85	10.83	10.82	10.80	10.79	10.77	10.75
26,000	11.48	11.45	11.42	11.39	11.37	11.34	11.31	11.28	11.26	11.24	11.22	11.20	11.18	11.17	11.15	11.13	11.11	11.10	11.08	11.06	11.05	11.03	11.01	11.00	10.98	10.96	10.95	10.93	10.92	10.90	10.88	10.87	10.85	10.84
26,200	11.60	11.56	11.52	11.49	11.46	11.44	11.40	11.36	11.34	11.33	11.31	11.29	11.27	11.25	11.24	11.22	11.20	11.18	11.17	11.15	11.13	11.12	11.10	11.08	11.07	11.05	11.03	11.02	11.00	10.98	10.97	10.95	10.94	10.92
26,400	11.72	11.68	11.64	11.60	11.57	11.54	11.49	11.45	11.43	11.41	11.39	11.38	11.36	11.34	11.32	11.30	11.29	11.27	11.25	11.23	11.22	11.20	11.18	11.17	11.15	11.13	11.12	11.10	11.08	11.07	11.05	11.04	11.02	11.01
26,600	11.84	11.80	11.75	11.72	11.68	11.65	11.60	11.55	11.52	11.50	11.48	11.46	11.44	11.43	11.41	11.39	11.37	11.35	11.34	11.32	11.30	11.29	11.27	11.25	11.23	11.22	11.20	11.18	11.17	11.15	11.14	11.12	11.10	11.09
26,800	11.96	11.91	11.87	11.83	11.79	11.75	11.71	11.66	11.63	11.61	11.58	11.56	11.54	11.51	11.49	11.48	11.46	11.44	11.42	11.40	11.39	11.37	11.35	11.34	11.32	11.30	11.29	11.27	11.25	11.24	11.22	11.20	11.19	11.17
27,000	12.09	12.04	11.99	11.94	11.90	11.86	11.82	11.78	11.75	11.72	11.69	11.66	11.64	11.61	11.59	11.57	11.55	11.53	11.51	11.49	11.47	11.46	11.44	11.42	11.40	11.39	11.37	11.35	11.34	11.32	11.30	11.29	11.27	11.26
27,200	12.23	12.18	12.12	12.07	12.02	11.97	11.93	11.89	11.86	11.82	11.79	11.76	11.74	11.71	11.69	11.67	11.64	11.62	11.60	11.58	11.56	11.54	11.52	11.51	11.49	11.47	11.45	11.44	11.42	11.40	11.39	11.37	11.36	11.34
27,400	12.38	12.31	12.26	12.20	12.15	12.10	12.05	12.01	11.97	11.93	11.90	11.87	11.84	11.81	11.79	11.76	11.74	11.72	11.70	11.66	11.64	11.63	11.61	11.59	11.57	11.56	11.54	11.52	11.51	11.49	11.47	11.46	11.44	11.42
27,600	12.52	12.45	12.39	12.33	12.28	12.23	12.18	12.13	12.09	12.04	12.00	11.97	11.94	11.91	11.88	11.86	11.83	11.81	11.79	11.75	11.73	11.71	11.69	11.68	11.66	11.64	11.62	11.61	11.59	11.57	11.56	11.54	11.52	11.51
27,800	12.68	12.60	12.53	12.47	12.41	12.36	12.30	12.26	12.21	12.16	12.12	12.08	12.05	12.01	11.98	11.95	11.93	11.90	11.88	11.84	11.81	11.80	11.78	11.76	11.74	11.73	11.71	11.69	11.67	11.66	11.64	11.62	11.61	11.59
28,000	12.84	12.76	12.69	12.62	12.55	12.48	12.43	12.38	12.33	12.28	12.24	12.20	12.16	12.12	12.09	12.06	12.03	12.00	11.97	11.92	11.90	11.88	11.86	11.84	11.83	11.81	11.79	11.77	11.76	11.74	11.72	11.71	11.69	11.67
28,200	13.00	12.92	12.84	12.77	12.70	12.63	12.57	12.50	12.45	12.40	12.36	12.31	12.27	12.24	12.20	12.16	12.13	12.10	12.07	12.01	11.98	11.97	11.95	11.93	11.91	11.89	11.88	11.86	11.84	11.82	11.81	11.79	11.77	11.76
28,400	13.18	13.09	13.00	12.92	12.85	12.78	12.71	12.65	12.59	12.53	12.48	12.43	12.39	12.35	12.31	12.27	12.24	12.21	12.18	12.12	12.09	12.06	12.04	12.02	12.00	11.98	11.96	11.94	11.93	11.91	11.89	11.87	11.86	11.84
28,600	13.37	13.27	13.18	13.09	13.00	12.93	12.86	12.79	12.73	12.67	12.61	12.55	12.50	12.46	12.42	12.38	12.34	12.31	12.28	12.23	12.19	12.17	12.14	12.12	12.09	12.07	12.05	12.03	12.01	11.99	11.98	11.96	11.94	11.92
28,800	13.56	13.45	13.36	13.26	13.17	13.09	13.01	12.94	12.87	12.81	12.75	12.69	12.63	12.58	12.53	12.49	12.45	12.41	12.38	12.33	12.30	12.27	12.24	12.22	12.19	12.17	12.15	12.12	12.10	12.08	12.06	12.04	12.02	12.01
29,000	13.75	13.64	13.53	13.43	13.34	13.25	13.17	13.09	13.01	12.95	12.88	12.82	12.76	12.71	12.66	12.61	12.56	12.52	12.48	12.44	12.41	12.37	12.35	12.32	12.29	12.26	12.24	12.22	12.20	12.18	12.16	12.13	12.11	12.09
29,200	13.95	13.84	13.72	13.61	13.51	13.42	13.33	13.24	13.16	13.09	13.02	12.95	12.89	12.84	12.78	12.73	12.68	12.63	12.59	12.55	12.51	12.48	12.45	12.42	12.39	12.36	12.34	12.31	12.29	12.27	12.25	12.21	12.19	12.17
29,400	14.15	14.03	13.91	13.79	13.68	13.58	13.49	13.40	13.31	13.23	13.15	13.08	13.02	12.96	12.90	12.85	12.79	12.74	12.70	12.66	12.62	12.58	12.55	12.52	12.49	12.46	12.43	12.40	12.38	12.36	12.34	12.29	12.28	12.26
29,600	14.34	14.20	14.08	13.96	13.84	13.73	13.64	13.55	13.46	13.37	13.29	13.21	13.15	13.08	13.02	12.97	12.91	12.86	12.81	12.76	12.72	12.68	12.65	12.61	12.58	12.55	12.52	12.50	12.47	12.45	12.43	12.38	12.36	12.34
29,800	14.52	14.37	14.24	14.12	14.01	13.89	13.78	13.69	13.60	13.51	13.42	13.34	13.27	13.20	13.14	13.08	13.02	12.97	12.92	12.87	12.82	12.78	12.74	12.71	12.68	12.64	12.61	12.59	12.56	12.54	12.52	12.46	12.44	12.43
30,000	14.69	14.54	14.40	14.27	14.15	14.04	13.93	13.82	13.73	13.64	13.55	13.47	13.39	13.32	13.25	13.19	13.13	13.08	13.02	12.97	12.93	12.88	12.84	12.80	12.77	12.74	12.71	12.68	12.65	12.63	12.61	12.55	12.53	12.51

Table 7 Diversion Inlet Control Structure (DICS) Gate Opening (ft) - Part E

Flow through DICS (cfs)	Staging Area Elevation at Wild Rice River, $Z_{STAGING\text{-}AREA\text{-}WRR}$ (ft)												
	923.8	923.9	924	924.1	924.2	924.3	924.4	924.5	924.6	924.7	924.8	924.9	925
0	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
100	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
200	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
300	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
400	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
500	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.20	0.20
600	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
700	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
800	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
900	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
1,000	0.42	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
1,100	0.46	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
1,200	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.49
1,300	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53	0.53
1,400	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.57	0.57	0.57
1,500	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.61	0.61
1,600	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.65
1,700	0.71	0.71	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
1,800	0.75	0.75	0.75	0.75	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
1,900	0.79	0.79	0.79	0.79	0.79	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
2,000	0.83	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.82	0.82	0.82	0.82	0.82
2,100	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.86	0.86
2,200	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90
2,300	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94
2,400	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98
2,500	1.04	1.04	1.04	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.02	1.02
2,600	1.08	1.08	1.08	1.08	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.06	1.06
2,700	1.12	1.12	1.12	1.12	1.12	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.10
2,800	1.16	1.16	1.16	1.16	1.16	1.16	1.15	1.15	1.15	1.15	1.15	1.15	1.15
2,900	1.21	1.20	1.20	1.20	1.20	1.20	1.20	1.19	1.19	1.19	1.19	1.19	1.19
3,000	1.25	1.25	1.24	1.24	1.24	1.24	1.24	1.24	1.23	1.23	1.23	1.23	1.23
3,100	1.29	1.29	1.28	1.28	1.28	1.28	1.28	1.28	1.27	1.27	1.27	1.27	1.27
3,200	1.33	1.33	1.33	1.32	1.32	1.32	1.32	1.32	1.32	1.31	1.31	1.31	1.31
3,300	1.37	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.36	1.36	1.35	1.35	1.35
3,400	1.41	1.41	1.41	1.41	1.41	1.40	1.40	1.40	1.40	1.40	1.39	1.39	1.39
3,500	1.45	1.45	1.45	1.45	1.45	1.44	1.44	1.44	1.44	1.44	1.44	1.43	1.43
3,600	1.50	1.49	1.49	1.49	1.49	1.49	1.48	1.48	1.48	1.48	1.48	1.47	1.47
3,700	1.54	1.54	1.53	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.52	1.52	1.51
3,800	1.58	1.58	1.58	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.56	1.56	1.55
3,900	1.62	1.62	1.62	1.61	1.61	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.60
4,000	1.66	1.66	1.66	1.66	1.65	1.65	1.65	1.65	1.64	1.64	1.64	1.64	1.64
4,100	1.70	1.70	1.70	1.70	1.69	1.69	1.69	1.69	1.69	1.68	1.68	1.68	1.68
4,200	1.75	1.74	1.74	1.74	1.74	1.73	1.73	1.73	1.73	1.72	1.72	1.72	1.72
4,300	1.79	1.78	1.78	1.78	1.78	1.78	1.77	1.77	1.77	1.77	1.76	1.76	1.76
4,400	1.83	1.83	1.82	1.82	1.82	1.82	1.81	1.81	1.81	1.81	1.80	1.80	1.80
4,500	1.87	1.87	1.87	1.86	1.86	1.86	1.86	1.85	1.85	1.85	1.85	1.84	1.84
4,600	1.91	1.91	1.91	1.90	1.90	1.90	1.90	1.89	1.89	1.89	1.89	1.88	1.88
4,700	1.95	1.95	1.95	1.95	1.94	1.94	1.94	1.94	1.93	1.93	1.93	1.93	1.92
4,800	2.00	1.99	1.99	1.99	1.98	1.98	1.98	1.98	1.97	1.97	1.97	1.97	1.96
4,900	2.04	2.03	2.03	2.03	2.03	2.02	2.02	2.02	2.02	2.01	2.01	2.01	2.00
5,000	2.08	2.08	2.07	2.07	2.07	2.06	2.06	2.06	2.06	2.05	2.05	2.05	2.05
5,200	2.16	2.16	2.16	2.15	2.15	2.15	2.14	2.14	2.14	2.14	2.13	2.13	2.13
5,400	2.24	2.24	2.24	2.24	2.23	2.23	2.23	2.22	2.22	2.22	2.21	2.21	2.21
5,600	2.33	2.32	2.32	2.32	2.32	2.31	2.31	2.31	2.30	2.30	2.30	2.29	2.29
5,800	2.41	2.41	2.40	2.40	2.40	2.39	2.39	2.39	2.39	2.38	2.38	2.38	2.37
6,000	2.49	2.49	2.49	2.48	2.48	2.48	2.47	2.47	2.47	2.46	2.46	2.46	2.45
6,200	2.58	2.57	2.57	2.57	2.56	2.56	2.56	2.55	2.55	2.55	2.54	2.54	2.54
6,400	2.66	2.66	2.65	2.65	2.65	2.64	2.64	2.64	2.63	2.63	2.63	2.62	2.62
6,600	2.74	2.74	2.74	2.73	2.73	2.73	2.72	2.72	2.71	2.71	2.71	2.70	2.70
6,800	2.83	2.82	2.82	2.82	2.81	2.81	2.80	2.80	2.80	2.79	2.79	2.79	2.78
7,000	2.91	2.91	2.90	2.90	2.89	2.89	2.89	2.88	2.88	2.88	2.87	2.87	2.86
7,200	2.99	2.99	2.99	2.98	2.98	2.97	2.97	2.97	2.96	2.96	2.95	2.95	2.95
7,400	3.08	3.07	3.07	3.06	3.06	3.06	3.05	3.05	3.04	3.04	3.04	3.03	3.03
7,600	3.16	3.16	3.15	3.15	3.14	3.14	3.13	3.13	3.13	3.12	3.12	3.11	3.11
7,800	3.24	3.24	3.23	3.23	3.23	3.22	3.22	3.21	3.21	3.20	3.20	3.20	3.19
8,000	3.33	3.32	3.32	3.31	3.31	3.30	3.30	3.29	3.29	3.29	3.28	3.28	3.27
8,200	3.41	3.40	3.40	3.40	3.39	3.39	3.38	3.38	3.37	3.37	3.36	3.36	3.36
8,400	3.49	3.49	3.48	3.48	3.47	3.47	3.46	3.46	3.46	3.45	3.45	3.44	3.44
8,600	3.58	3.57	3.57	3.56	3.56	3.55	3.55	3.54	3.54	3.53	3.53	3.52	3.52
8,800	3.66	3.65	3.65	3.64	3.64	3.63	3.63	3.62	3.62	3.61	3.61	3.61	3.60
9,000	3.74	3.74	3.73	3.73	3.72	3.72	3.71	3.71	3.70	3.70	3.69	3.69	3.68
9,200	3.83	3.82	3.81	3.81	3.80	3.80	3.79	3.79	3.78	3.78	3.77	3.77	3.76
9,400	3.91	3.90	3.90	3.89	3.89	3.88	3.88	3.87	3.87	3.86	3.86	3.85	3.85
9,600	3.99	3.99	3.98	3.98	3.97	3.96	3.96	3.95	3.95	3.94	3.94	3.93	3.93
9,800	4.08	4.07	4.06	4.06	4.05	4.05	4.04	4.04	4.03	4.03	4.02	4.02	4.01
10,000	4.16	4.15	4.15	4.14	4.14	4.13	4.12	4.12	4.11	4.11	4.10	4.10	4.09
10,200	4.24	4.24	4.23	4.22	4.22	4.21	4.21	4.20	4.20	4.19	4.18	4.18	4.17
10,400	4.32	4.32	4.31	4.31	4.30	4.30	4.29	4.28	4.28	4.27	4.27	4.26	4.26
10,600	4.41	4.40	4.40	4.39	4.38	4.38	4.37	4.37	4.36	4.35	4.35	4.34	4.34
10,800	4.49	4.49	4.48	4.47	4.47	4.46	4.45	4.45	4.44	4.44	4.43	4.43	4.42
11,000	4.57	4.57	4.56	4.56	4.55	4.54	4.54	4.53	4.53	4.52	4.51	4.51	4.50
11,200	4.66	4.65	4.64	4.64	4.63	4.63	4.62	4.61	4.61	4.60	4.60	4.59	4.58
11,400	4.74	4.73	4.73	4.72	4.72	4.71	4.70	4.70	4.69	4.68	4.68	4.67	4.67
11,600	4.82	4.82	4.81	4.80	4.80	4.79	4.78	4.78	4.77	4.77	4.76	4.75	4.75
11,800	4.91	4.90	4.89	4.89	4.88	4.87	4.87	4.86	4.85	4.85	4.84	4.84	4.83
12,000	4.99	4.98	4.98	4.97	4.96	4.96	4.95	4.94	4.94	4.93	4.92	4.92	4.91
12,200	5.07	5.07	5.06	5.05	5.05	5.04	5.03	5.03	5.02	5.01	5.01	5.00	4.99
12,400	5.16	5.15	5.14	5.14	5.13	5.12	5.12	5.11	5.10	5.09	5.09	5.08	5.07
12,600	5.24	5.23	5.23	5.22	5.21	5.20	5.20	5.19	5.18	5.18	5.17	5.16	5.16
12,800	5.32	5.32	5.31	5.30	5.29	5.29	5.28	5.27	5.27	5.26	5.25	5.25	5.24
13,000	5.41	5.40	5.39	5.38	5.38	5.37	5.36	5.36	5.35	5.34	5.33	5.33	5.32
13,200	5.49	5.48	5.48	5.47	5.46	5.45	5.45	5.44	5.43	5.42	5.42	5.41	5.40
13,400	5.57	5.57	5.56	5.55	5.54	5.54	5.53	5.52	5.51	5.51	5.50	5.49	5.48
13,600	5.66	5.65	5.64	5.63	5.63	5.62	5.61	5.60	5.60	5.59	5.58	5.57	5.57
13,800	5.74	5.73	5.72	5.72	5.71	5.70	5.69	5.69	5.68	5.67	5.66	5.66	5.65
14,000	5.82	5.82	5.81	5.80	5.79	5.78	5.78	5.77	5.76	5.75	5.74	5.74	5.73
14,200	5.91	5.90	5.89	5.88	5.87	5.87	5.86	5.85	5.84	5.83	5.83	5.82	5.81
14,400	5.99	5.98	5.97	5.96	5.96	5.95	5.94	5.93	5.92	5.92	5.91	5.90	5.89
14,600	6.07	6.06	6.06	6.05	6.04	6.03	6.02	6.02	6.01	6.00	5.99	5.98	5.98
14,800	6.16	6.15	6.14	6.13	6.12	6.11	6.11	6.10	6.09	6.08	6.07	6.07	6.06
15,000	6.24	6.23	6.22	6.21	6.21	6.20	6.19	6.18	6.17	6.16	6.16	6.15	6.14
15,200	6.32	6.31	6.31	6.30	6.29	6.28	6.27	6.26	6.25	6.25	6.24	6.23	6.22
15,400	6.41	6.40	6.39	6.38	6.37	6.36	6.35	6.35	6.34	6.33	6.32	6.31	6.30
15,600	6.49	6.48	6.47	6.46	6.45	6.44	6.44	6.43	6.42	6.41	6.40	6.39	6.39
15,800	6.57	6.56	6.55	6.55	6.54	6.53	6.52	6.51	6.50	6.49	6.48	6.48	6.47
16,000	6.66	6.65	6.64	6.63	6.62	6.61	6.60	6.59	6.58	6.57	6.57	6.56	6.55
16,200	6.74	6.73	6.72	6.71	6.70	6.69	6.68	6.68	6.67	6.66	6.65	6.64	6.63
16,400	6.82	6.81	6.80	6.79	6.78	6.78	6.77	6.76	6.75	6.74	6.73	6.72	6.71
16,600	6.91	6.90	6.89	6.88	6.87	6.86	6.85	6.84	6.83	6.82	6.81	6.80	6.79
16,800	6.99	6.98	6.97	6.96	6.95	6.94	6.93	6.92	6.91	6.90	6.89	6.89	6.88
17,000	7.07	7.06	7.05	7.04	7.03	7.02	7.01	7.00	7.00	6.99	6.98	6.97	6.96
17,200	7.16	7.15	7.14	7.13	7.12	7.11	7.10	7.09	7.08	7.07	7.06	7.05	7.04
17,400	7.24	7.23	7.22	7.21	7.20	7.19	7.18	7.17	7.16	7.15	7.14	7.13	7.12
17,600	7.32	7.31	7.30	7.29	7.28	7.27	7.26	7.25	7.24	7.23	7.22	7.21	7.20
17,800	7.41	7.40	7.39	7.37	7.36	7.35	7.34	7.33	7.33	7.32	7.31	7.30	7.29
18,000	7.49	7.48	7.47	7.46	7.45	7.44	7.43	7.42	7.41	7.40	7.39	7.38	7.37
18,200	7.57	7.56	7.55	7.54	7.53	7.52	7.51	7.50	7.49	7.48	7.47	7.46	7.45
18,400	7.66	7.64	7.63	7.62	7.61	7.60	7.59	7.58	7.57	7.56	7.55	7.54	7.53
18,600	7.74	7.73	7.72	7.71	7.70	7.69	7.68	7.66	7.65	7.64	7.63	7.62	7.61
18,800	7.82	7.81	7.80	7.79	7.78	7.77	7.76	7.75	7.74	7.73	7.72	7.71	7.70
19,000	7.91	7.89	7.88	7.87	7.86	7.85	7.84	7.83	7.82	7.81	7.80	7.79	7.78
19,200	7.99	7.98	7.97	7.96	7.94	7.93	7.92	7.91	7.90	7.89	7.88	7.87	7.86
19,400	8.07	8.06	8.05	8.04	8.03	8.02	8.01	7.99	7.98	7.97	7.96	7.95	7.94
19,600	8.16	8.14	8.13	8.12	8.11	8.10	8.09	8.08	8.07	8.06	8.04	8.03	8.02
19,800	8.24	8.23	8.22	8.20	8.19	8.18	8.17	8.16	8.15	8.14	8.13	8.12	8.11
20,000	8.32	8.31	8.30	8.29	8.28	8.26	8.25	8.24	8.23	8.22	8.21	8.20	8.19
20,200	8.41	8.39	8.38	8.37	8.36	8.35	8.34	8.32	8.31	8.30	8.29	8.28	8.27
20,400	8.49	8.48	8.47	8.45	8.44	8.43	8.42	8.41	8.40	8.38	8.37	8.36	8.35
20,600	8.57	8.56	8.55	8.54	8.52	8.51	8.50	8.49	8.48	8.47	8.46	8.44	8.43
20,800	8.66	8.64	8.63	8.62	8.61	8.60	8.58	8.57	8.56	8.55	8.54	8.53	8.52
21,000	8.74	8.73	8.71	8.70	8.69	8.68	8.67	8.65	8.64	8.63	8.62	8.61	8.60
21,200	8.82	8.81	8.80	8.79	8.77	8.76	8.75	8.74	8.73	8.71	8.70	8.69	8.68
21,400	8.91	8.89	8.88	8.87	8.86	8.84	8.83	8.82	8.81	8.80	8.78	8.77	8.76
21,600	8.99	8.98	8.96	8.95	8.94	8.93	8.91	8.90	8.89	8.88	8.87	8.85	8.84
21,800	9.07	9.06	9.05	9.03	9.02	9.01	9.00	8.99	8.97	8.96	8.95	8.94	8.93
22,000	9.16	9.14	9.13	9.12	9.10	9.09	9.08	9.07	9.06	9.04	9.03	9.02	9.01
22,200	9.24	9.23	9.21	9.20	9.19	9.18	9.16	9.15	9.14	9.13	9.11	9.10	9.09
22,400	9.32	9.31	9.30	9.28	9.27	9.26	9.25	9.23	9.22	9.21	9.20	9.18	9.17
22,600	9.41	9.39	9.38	9.37	9.35	9.34	9.33	9.32	9.30	9.29	9.28	9.27	9.25
22,800	9.49	9.48	9.46	9.45	9.44	9.42	9.41	9.40	9.39	9.37	9.36	9.35	9.33
23,000	9.57	9.56	9.55	9.53	9.52	9.51	9.49	9.48	9.47	9.45	9.44	9.43	9.42
23,200	9.66	9.64	9.63	9.62	9.60	9.59	9.58	9.56	9.55	9.54	9.52	9.51	9.50
23,400	9.74	9.73	9.71	9.70	9.69	9.67	9.66	9.65	9.63	9.62	9.61	9.59	9.58
23,600	9.82	9.81	9.79	9.78	9.77	9.75	9.74	9.73	9.71	9.70	9.69	9.68	9.66
23,800	9.91	9.89	9.88	9.86	9.85	9.84	9.82	9.81	9.80	9.78	9.77	9.76	9.74
24,000	9.99	9.98	9.96	9.95	9.93	9.92	9.91	9.89	9.88	9.87	9.85	9.84	9.83
24,200	10.07	10.06	10.04	10.03	10.02	10.00	9.99	9.98	9.96	9.95	9.94	9.92	9.91
24,400	10.16	10.14	10.13	10.11	10.10	10.09	10.07	10.06	10.04	10.03	10.02	10.00	9.99
24,600	10.24	10.22	10.21	10.20	10.18	10.17	10.15	10.14	10.13	10.11	10.10	10.09	10.07
24,800	10.32	10.31	10.29	10.28	10.27	10.25	10.24	10.22	10.21	10.20	10.18	10.17	10.15
25,000	10.41	10.39	10.38	10.36	10.35	10.33	10.32	10.31	10.29	10.28	10.26	10.25	10.24
25,200	10.49	10.47	10.46	10.45	10.43	10.42	10.40	10.39	10.37	10.36	10.35	10.33	10.32
25,400	10.57	10.56	10.54	10.53	10.51	10.50	10.49	10.47	10.46	10.44	10.43	10.41	10.40
25,600	10.66	10.64	10.63	10.61	10.60	10.58	10.57	10.55	10.54	10.52	10.51	10.50	10.48
25,800	10.74	10.72	10.71	10.69	10.68	10.67	10.65	10.64	10.62	10.61	10.59	10.58	10.56
26,000	10.82	10.81	10.79	10.78	10.76	10.75	10.73	10.72	10.70	10.69	10.68	10.66	10.65
26,200	10.91	10.89	10.88	10.86	10.85	10.83	10.82	10.80	10.79	10.77	10.76	10.74	10.73
26,400	10.99	10.97	10.96	10.94	10.93	10.91	10.90	10.88	10.87	10.85	10.84	10.83	10.81
26,600	11.07	11.06	11.04	11.03	11.01	11.00	10.98	10.97	10.95	10.94	10.92	10.91	10.89
26,800	11.16	11.14	11.13	11.11	11.09	11.08	11.06	11.05	11.03	11.02	11.00	10.99	10.97
27,000	11.24	11.22	11.21	11.19	11.18	11.16	11.15	11.13	11.12	11.10	11.09	11.07	11.06
27,200	11.32	11.31	11.29	11.28	11.26	11.25	11.23	11.21	11.20	11.18	11.17	11.15	11.14
27,400	11.41	11.39	11.37	11.36	11.34	11.33	11.31	11.30	11.28	11.27	11.25	11.24	11.22
27,600	11.49	11.47	11.46	11.44	11.43	11.41	11.39	11.38	11.36	11.35	11.33	11.32	11.30
27,800	11.57	11.56	11.54	11.53	11.51	11.49	11.48	11.46	11.45	11.43	11.42	11.40	11.38
28,000	11.66	11.64	11.62	11.61	11.59	11.58	11.56	11.54	11.53	11.51	11.50	11.48	11.47
28,200	11.74	11.72	11.71	11.69	11.68	11.66	11.64	11.63	11.61	11.60	11.58	11.57	11.55
28,400	11.82	11.81	11.79	11.77	11.76	11.74	11.73	11.71	11.69	11.68	11.67	11.65	11.64
28,600	11.91	11.89	11.87	11.86	11.84	11.82	11.81	11.79	11.78	11.76	11.75	11.74	11.73
28,800	11.99	11.97	11.96	11.94	11.92	11.91	11.89	11.87	11.86	11.84	11.83	11.83	11.82
29,000	12.07	12.06	12.04	12.02	12.01	11.99	11.97	11.96	11.94	11.93	11.92	11.92	11.91
29,200	12.16	12.14	12.12	12.11	12.09	12.07	12.06	12.04	12.02	12.01	12.00	12.00	12.00
29,400	12.24	12.22	12.21	12.19	12.17	12.16	12.14	12.12	12.11	12.10	12.09	12.09	12.09
29,600	12.32	12.31	12.29	12.27	12.26	12.24	12.22	12.21	12.20	12.19	12.18	12.18	12.18
29,800	12.41	12.39	12.37	12.36	12.34	12.32	12.30	12.29	12.29	12.28	12.27	12.27	12.27
30,000	12.49	12.47	12.46	12.44	12.42	12.40	12.39	12.38	12.37	12.37	12.37	12.36	12.36

Table 8 The Relationship between Allowable Flow though the Town and the Maximum Flow from Combined Enloe and Abercrombie

Flood Event	Maximum flow from combined Enloe and Abercrombie, $Q_{AE\text{-}MAX}$, (cfs)	Allowable flow through the town, Q_{TOWN}, (cfs)
0 to 100-year	0	18,000
	38,000	18,000
100-year to 500-year	39,000	18,000
	40,000	18,255
	41,000	18,892
	42,000	19,529
	43,000	20,167
	44,000	20,804
	45,000	21,441
	46,000	22,078
	47,000	22,716
	48,000	23,353
	49,000	23,990
	50,000	24,627
	60,000	31,000
500-year to Inflow Design Flood	102,000	31,000
Greater than Inflow Design Flood	102,001	200,000

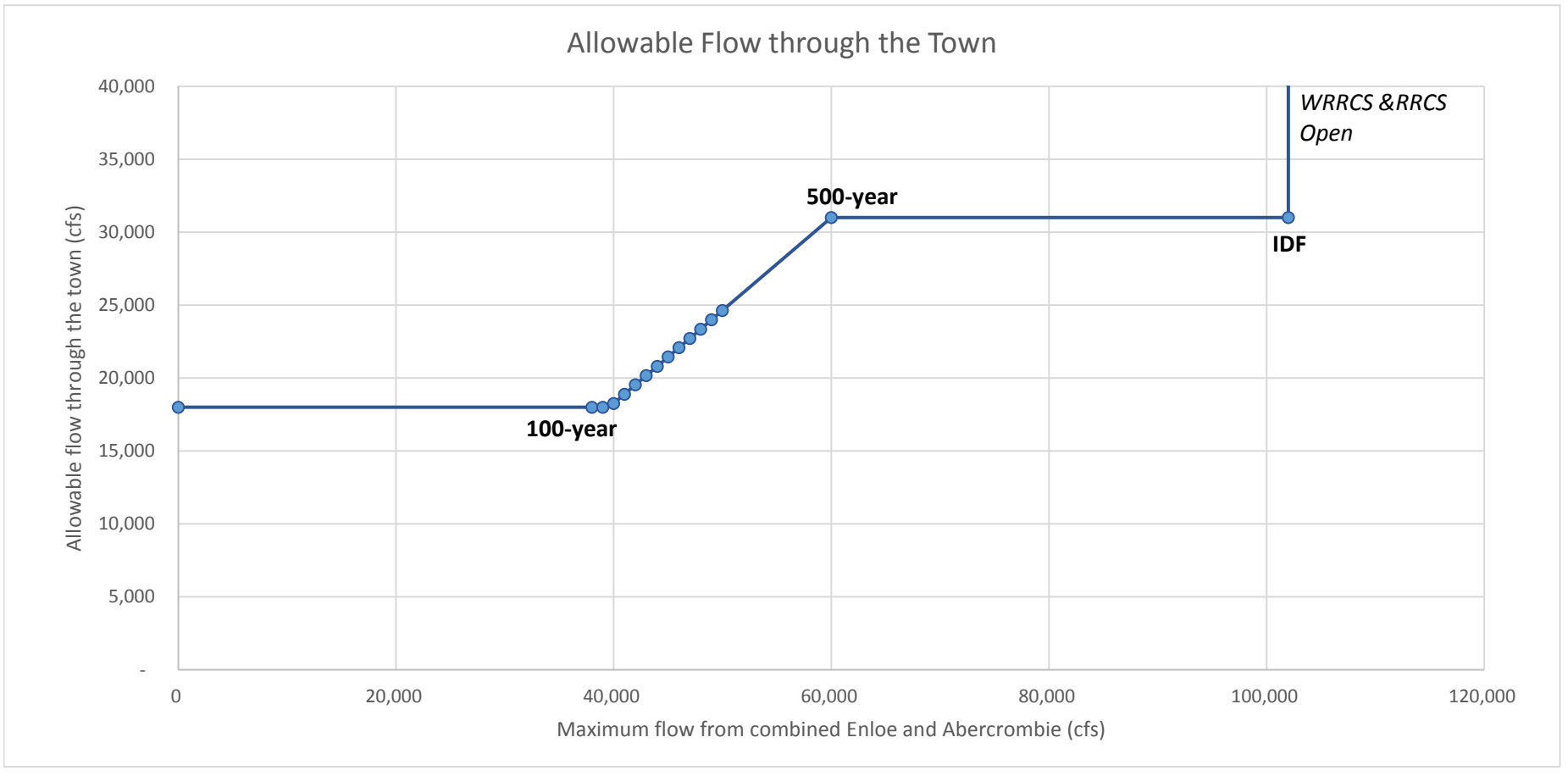


Table 9 Coefficient b [-] for the Nonlinear Reservoir Model (Transition segment)

Maximum flow from combined Enloe and Abercrombie $Q^{t}_{AE\text{-}MAX}$ (cfs)	Maximum flow reduction, $Q^{t}_{REDUCTION\text{-}MAX}$ (cfs)																	
	0	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	5,000	6,000	7,000	8,000	9,000	10,000	15,000	20,000	50,000
20,000	1.0117	1.0119	1.0120	1.0124	1.0127	1.0130	1.0133	1.0136	1.0140	1.0144	1.0148	1.0152	1.0157	1.0161	1.0165	1.0172	1.0184	1.0204
21,000	1.0116	1.0118	1.0119	1.0122	1.0126	1.0129	1.0132	1.0135	1.0138	1.0142	1.0147	1.0151	1.0155	1.0159	1.0164	1.0170	1.0183	1.0202
22,000	1.0115	1.0117	1.0118	1.0121	1.0124	1.0127	1.0131	1.0134	1.0137	1.0141	1.0145	1.0149	1.0154	1.0158	1.0162	1.0168	1.0181	1.0200
23,000	1.0114	1.0115	1.0117	1.0120	1.0123	1.0126	1.0129	1.0132	1.0136	1.0140	1.0144	1.0148	1.0152	1.0156	1.0160	1.0167	1.0179	1.0198
24,000	1.0113	1.0114	1.0116	1.0119	1.0122	1.0125	1.0128	1.0131	1.0134	1.0138	1.0142	1.0146	1.0151	1.0155	1.0159	1.0165	1.0177	1.0196
25,000	1.0112	1.0113	1.0115	1.0118	1.0121	1.0124	1.0127	1.0130	1.0133	1.0137	1.0141	1.0145	1.0149	1.0153	1.0157	1.0163	1.0175	1.0194
26,000	1.0111	1.0112	1.0113	1.0116	1.0119	1.0122	1.0125	1.0129	1.0132	1.0136	1.0140	1.0144	1.0148	1.0152	1.0156	1.0162	1.0174	1.0192
27,000	1.0109	1.0111	1.0112	1.0115	1.0118	1.0121	1.0124	1.0127	1.0130	1.0134	1.0138	1.0142	1.0146	1.0150	1.0154	1.0160	1.0172	1.0190
28,000	1.0108	1.0110	1.0111	1.0114	1.0117	1.0120	1.0123	1.0126	1.0129	1.0133	1.0137	1.0141	1.0145	1.0148	1.0152	1.0158	1.0170	1.0188
29,000	1.0107	1.0109	1.0110	1.0113	1.0116	1.0119	1.0122	1.0125	1.0127	1.0131	1.0135	1.0139	1.0143	1.0147	1.0151	1.0157	1.0168	1.0186
30,000	1.0106	1.0107	1.0109	1.0112	1.0115	1.0118	1.0120	1.0123	1.0126	1.0130	1.0134	1.0138	1.0142	1.0145	1.0149	1.0155	1.0167	1.0184
31,000	1.0104	1.0106	1.0107	1.0110	1.0113	1.0116	1.0118	1.0121	1.0124	1.0128	1.0132	1.0136	1.0139	1.0143	1.0147	1.0153	1.0164	1.0181
32,000	1.0103	1.0104	1.0105	1.0108	1.0111	1.0114	1.0117	1.0119	1.0122	1.0126	1.0130	1.0133	1.0137	1.0141	1.0145	1.0150	1.0161	1.0178
33,000	1.0101	1.0102	1.0104	1.0106	1.0109	1.0112	1.0115	1.0117	1.0120	1.0124	1.0127	1.0131	1.0135	1.0138	1.0142	1.0148	1.0159	1.0175
34,000	1.0099	1.0101	1.0102	1.0105	1.0107	1.0110	1.0113	1.0115	1.0118	1.0122	1.0125	1.0129	1.0133	1.0136	1.0140	1.0145	1.0156	1.0172
35,000	1.0098	1.0099	1.0100	1.0103	1.0106	1.0108	1.0111	1.0113	1.0116	1.0120	1.0123	1.0127	1.0130	1.0134	1.0137	1.0143	1.0153	1.0169
36,000	1.0096	1.0097	1.0099	1.0101	1.0104	1.0106	1.0109	1.0112	1.0114	1.0118	1.0121	1.0125	1.0128	1.0132	1.0135	1.0140	1.0151	1.0166
37,000	1.0094	1.0096	1.0097	1.0099	1.0102	1.0104	1.0107	1.0110	1.0112	1.0116	1.0119	1.0122	1.0126	1.0129	1.0133	1.0138	1.0148	1.0164
38,000	1.0093	1.0094	1.0095	1.0098	1.0100	1.0103	1.0105	1.0108	1.0110	1.0114	1.0117	1.0120	1.0124	1.0127	1.0130	1.0135	1.0145	1.0161
39,000	1.0091	1.0092	1.0093	1.0096	1.0098	1.0101	1.0103	1.0106	1.0108	1.0111	1.0115	1.0118	1.0121	1.0125	1.0128	1.0133	1.0143	1.0158
40,000	1.0089	1.0090	1.0092	1.0094	1.0096	1.0099	1.0101	1.0104	1.0106	1.0109	1.0113	1.0116	1.0119	1.0122	1.0126	1.0130	1.0140	1.0155
41,000	1.0087	1.0089	1.0090	1.0092	1.0094	1.0097	1.0099	1.0102	1.0104	1.0107	1.0110	1.0113	1.0117	1.0120	1.0123	1.0128	1.0137	1.0151
42,000	1.0086	1.0087	1.0088	1.0090	1.0092	1.0095	1.0097	1.0099	1.0102	1.0105	1.0108	1.0111	1.0114	1.0117	1.0120	1.0125	1.0134	1.0148
43,000	1.0084	1.0085	1.0086	1.0088	1.0090	1.0093	1.0095	1.0097	1.0099	1.0103	1.0106	1.0109	1.0112	1.0115	1.0118	1.0122	1.0131	1.0145
44,000	1.0092	1.0093	1.0094	1.0097	1.0099	1.0102	1.0104	1.0107	1.0109	1.0113	1.0116	1.0120	1.0123	1.0126	1.0130	1.0135	1.0145	1.0160
45,000	1.0100	1.0102	1.0103	1.0106	1.0109	1.0111	1.0114	1.0117	1.0120	1.0123	1.0127	1.0130	1.0134	1.0138	1.0141	1.0147	1.0158	1.0174
46,000	1.0109	1.0110	1.0112	1.0115	1.0118	1.0121	1.0124	1.0127	1.0130	1.0133	1.0137	1.0141	1.0145	1.0149	1.0153	1.0159	1.0171	1.0189
47,000	1.0117	1.0119	1.0120	1.0124	1.0127	1.0130	1.0133	1.0136	1.0140	1.0144	1.0148	1.0152	1.0157	1.0161	1.0165	1.0172	1.0184	1.0204
48,000	1.0126	1.0127	1.0129	1.0132	1.0136	1.0139	1.0143	1.0146	1.0150	1.0154	1.0159	1.0163	1.0168	1.0172	1.0177	1.0184	1.0198	1.0218
49,000	1.0145	1.0147	1.0149	1.0153	1.0157	1.0161	1.0165	1.0169	1.0172	1.0178	1.0183	1.0188	1.0194	1.0199	1.0204	1.0212	1.0228	1.0252
50,000	1.0164	1.0166	1.0168	1.0173	1.0177	1.0182	1.0186	1.0191	1.0195	1.0201	1.0207	1.0213	1.0219	1.0225	1.0231	1.0240	1.0258	1.0286
51,000	1.0183	1.0186	1.0188	1.0193	1.0198	1.0203	1.0208	1.0213	1.0218	1.0225	1.0232	1.0238	1.0245	1.0252	1.0259	1.0269	1.0289	1.0319
52,000	1.0202	1.0205	1.0208	1.0213	1.0219	1.0224	1.0230	1.0236	1.0241	1.0249	1.0256	1.0263	1.0271	1.0278	1.0286	1.0297	1.0319	1.0353
53,000	1.0222	1.0225	1.0228	1.0234	1.0240	1.0246	1.0252	1.0258	1.0264	1.0272	1.0280	1.0288	1.0297	1.0305	1.0313	1.0325	1.0350	1.0387
54,000	1.0241	1.0244	1.0247	1.0254	1.0260	1.0267	1.0274	1.0280	1.0287	1.0296	1.0305	1.0314	1.0322	1.0331	1.0340	1.0353	1.0380	1.0421
55,000	1.0260	1.0263	1.0267	1.0274	1.0281	1.0288	1.0296	1.0303	1.0310	1.0319	1.0329	1.0339	1.0348	1.0358	1.0367	1.0382	1.0411	1.0454
56,000	1.0279	1.0283	1.0287	1.0294	1.0302	1.0310	1.0317	1.0325	1.0333	1.0343	1.0353	1.0364	1.0374	1.0384	1.0395	1.0410	1.0441	1.0488
57,000	1.0298	1.0302	1.0306	1.0315	1.0323	1.0331	1.0339	1.0347	1.0356	1.0367	1.0378	1.0389	1.0400	1.0411	1.0422	1.0438	1.0472	1.0522
58,000	1.0318	1.0322	1.0326	1.0335	1.0344	1.0352	1.0361	1.0370	1.0378	1.0390	1.0402	1.0414	1.0425	1.0437	1.0449	1.0467	1.0502	1.0555
59,000	1.0337	1.0341	1.0346	1.0355	1.0364	1.0374	1.0383	1.0392	1.0401	1.0414	1.0426	1.0439	1.0451	1.0464	1.0476	1.0495	1.0532	1.0589
60,000	1.0356	1.0361	1.0365	1.0375	1.0385	1.0395	1.0405	1.0414	1.0424	1.0437	1.0451	1.0464	1.0477	1.0490	1.0503	1.0523	1.0563	1.0623
65,000	1.0427	1.0432	1.0438	1.0450	1.0462	1.0474	1.0485	1.0497	1.0509	1.0525	1.0541	1.0557	1.0573	1.0588	1.0604	1.0628	1.0676	1.0749
70,000	1.0498	1.0504	1.0511	1.0525	1.0539	1.0552	1.0566	1.0580	1.0594	1.0613	1.0631	1.0650	1.0668	1.0687	1.0705	1.0734	1.0790	1.0875

Table 10 Coefficient c [-] for the Nonlinear Reservoir Model (Falling segment)

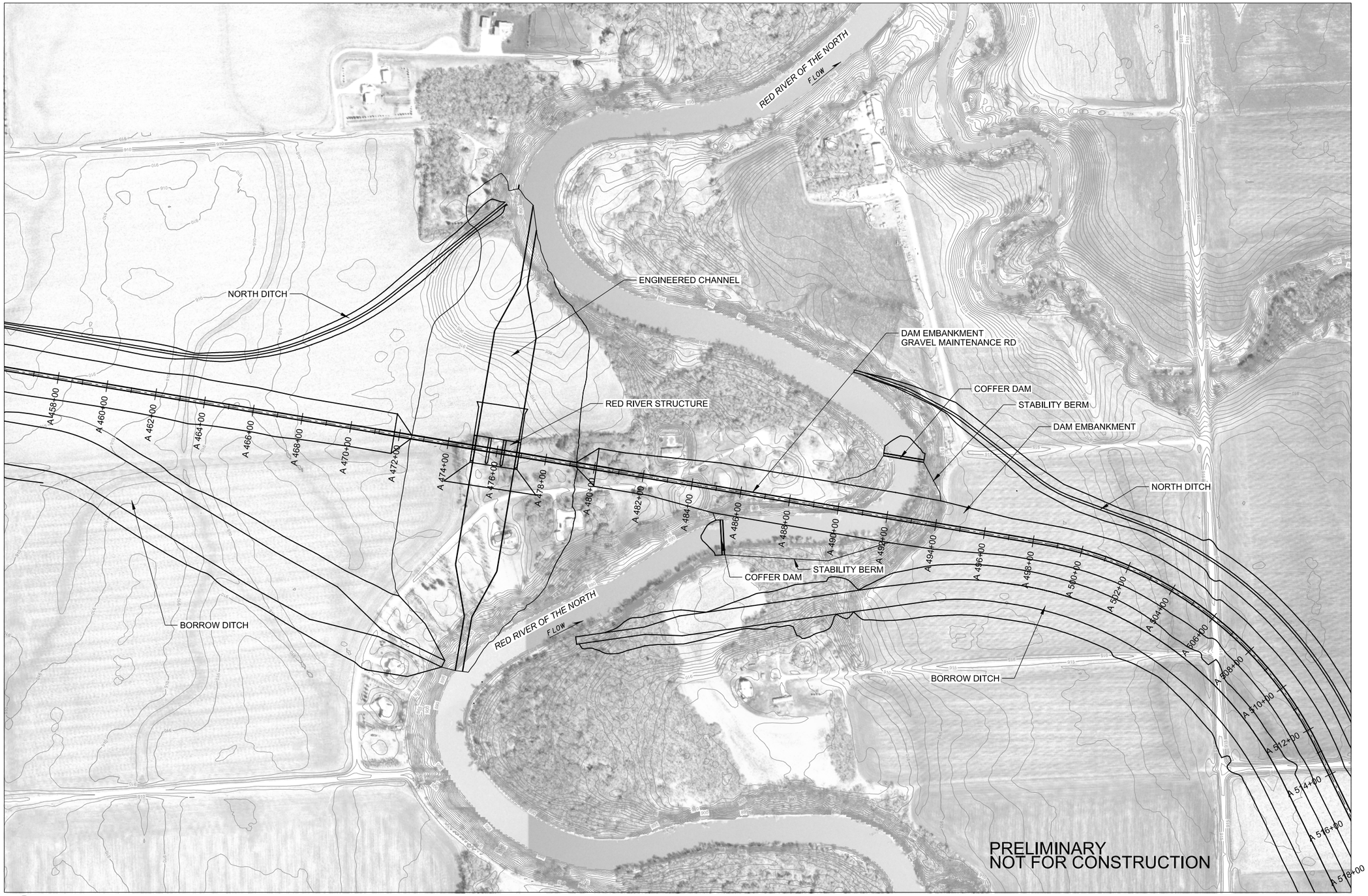
Maximum flow from combined Enloe and Abercrombie $Q^t_{AE\text{-}MAX}$ (cfs)	Maximum flow reduction, $Q^t_{REDUCTION\text{-}MAX}$ (cfs)																	
	0	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	5,000	6,000	7,000	8,000	9,000	10,000	15,000	20,000	50,000
20,000	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0008
21,000	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0008
22,000	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0008	0.0008	0.0008
23,000	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0008	0.0008	0.0009
24,000	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0008	0.0008	0.0009
25,000	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0008	0.0008	0.0009
26,000	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0008	0.0008	0.0009
27,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0008	0.0009
28,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0008	0.0009
29,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0008	0.0009
30,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	0.0009	0.0009
31,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	0.0009	0.0009
32,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	0.0009	0.0009
33,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	0.0009	0.0009
34,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	0.0009	0.0009
35,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	0.0009	0.0009
36,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	0.0009	0.0009
37,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	0.0008	0.0009	0.0009
38,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	0.0008	0.0009	0.0009
39,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	0.0008	0.0009	0.0009
40,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	0.0008	0.0009	0.0009
41,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	0.0007	0.0009	0.0009	0.0010
42,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	0.0007	0.0007	0.0009	0.0009	0.0010
43,000	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0009	0.0010	0.0010
44,000	0.0006	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0008	0.0009	0.0010	0.0011
45,000	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0010	0.0010	0.0011
46,000	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0010	0.0010	0.0011
47,000	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0010	0.0011	0.0011
48,000	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0009	0.0010	0.0011	0.0012
49,000	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0011	0.0011	0.0012
50,000	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0011	0.0012	0.0013
51,000	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0010	0.0012	0.0012	0.0013
52,000	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0010	0.0012	0.0013	0.0014
53,000	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0010	0.0010	0.0011	0.0013	0.0013	0.0014
54,000	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0013	0.0014	0.0015
55,000	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0014	0.0015	0.0016
56,000	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0014	0.0015	0.0016
57,000	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0015	0.0016	0.0017
58,000	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0015	0.0016	0.0017
59,000	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0016	0.0017	0.0018
60,000	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0016	0.0017	0.0018
65,000	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0020	0.0021	0.0023
70,000	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0018	0.0018	0.0018	0.0019	0.0019	0.0020	0.0024	0.0025	0.0027

Table 11 Designed Time Duration to Allow Maximum Flow through the Town

Maximum flow from combined Enloe and Abercrombie, $Q_{AE\text{-}MAX}$, (cfs)	Time Duration to Allow Maximum Flow through the Town, DT^{t}_{QTOWN}, (hr)
20,000	144
24,000	168
26,000	192
28,000	240
33,000	276
37,000	288
40,000	306
46,000	324
56,000	384
100,000	400

Table 12 Diversion Inlet Control Structure (DICS) Flow-Stage Relationship (Gate Open)

Staging Area Elevation at Wild Rice Rive, $Z_{STAGING-AREA-WRR}$ (ft)	Flow at DICS, Q_{DIVCS} (cfs)	Staging Area Elevation at Wild Rice Rive, $Z_{STAGING-AREA-WRR}$ (ft)	Flow at DICS, Q_{DIVCS} (cfs)
910.0	1,096	916.3	19,134
910.1	1,324	916.4	19,754
910.2	1,551	916.5	20,369
910.3	1,779	916.6	20,879
910.4	2,007	916.7	21,309
910.5	2,234	916.8	21,625
910.6	2,462	916.9	22,067
910.7	2,647	917.0	22,411
910.8	2,763	917.1	22,740
910.9	2,880	917.2	23,074
911.0	2,996	917.3	23,396
911.1	3,112	917.4	23,709
911.2	3,194	917.5	24,022
911.3	3,274	917.6	24,334
911.4	3,353	917.7	24,610
911.5	3,425	917.8	24,869
911.6	3,497	917.9	25,139
911.7	3,570	918.0	25,382
911.8	3,650	918.1	25,615
911.9	3,729	918.2	25,849
912.0	3,809	918.3	26,065
912.1	3,891	918.4	26,239
912.2	3,995	918.5	26,422
912.3	4,099	918.6	26,607
912.4	4,203	918.7	26,795
912.5	4,307	918.8	26,982
912.6	4,411	918.9	27,165
912.7	4,516	919.0	27,353
912.8	4,620	919.1	27,537
912.9	4,724	919.2	27,721
913.0	4,828	919.3	27,903
913.1	5,158	919.4	28,085
913.2	5,496	919.5	28,263
913.3	5,834	919.6	28,441
913.4	6,172	919.7	28,617
913.5	6,510	919.8	28,794
913.6	6,848	919.9	28,972
913.7	7,279	920.0	29,167
913.8	7,769	920.1	29,358
913.9	8,260	920.2	29,570
914.0	8,748	920.3	29,844
914.1	9,236	920.4	30,154
914.2	9,700	920.5	30,485
914.3	10,088	920.6	30,836
914.4	10,407	920.7	31,201
914.5	10,808	920.8	31,580
914.6	11,244	920.9	31,971
914.7	11,616	921.0	32,369
914.8	12,016	921.1	32,776
914.9	12,420	921.2	33,193
915.0	12,817	921.3	33,616
915.1	13,210	921.4	34,049
915.2	13,613	921.5	34,489
915.3	14,024	921.6	34,927
915.4	14,422	921.7	35,362
915.5	14,756	921.8	35,723
915.6	15,194	921.9	36,062
915.7	15,611	922.0	36,404
915.8	16,026	922.1	36,747
915.9	16,543	922.2	37,095
916.0	17,128	922.3	37,443
916.1	17,625	922.4	37,794
916.2	18,476	922.5	38,147



A1 PLAN VIEW

RED RIVER STRUCTURE

SCALE: 1"=200'

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

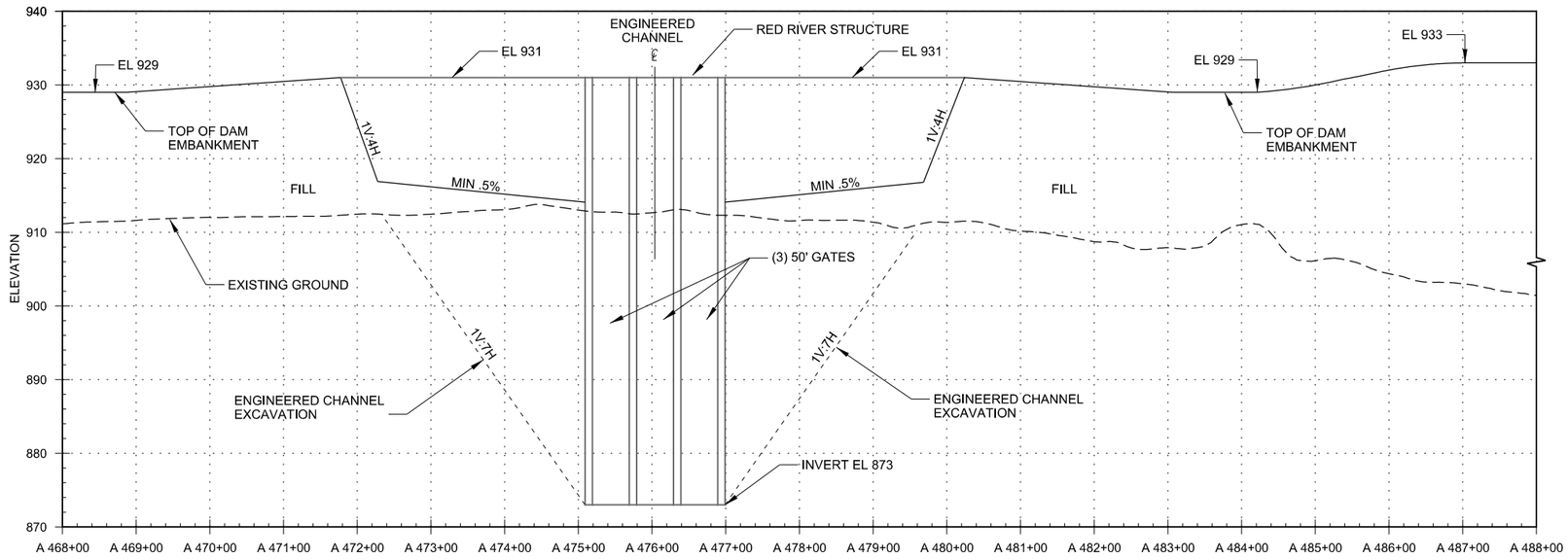
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA

DESIGNED BY: | DATE:
DWN BY: | CKD BY: | SOLICITATION NO.:
SUBMITTED BY: | CONTRACT NO.:
PLOT SCALE: | PLOT DATE: | FILE NUMBER:
SIZE: | FILE NAME: P:\MVP\RN_RRS_PERMIT_180530.dgn

FMM SOUTHERN EMBANKMENT
RED RIVER OF THE NORTH RIVER BASIN
FARGO-MOORHEAD FLOOD RISK MANAGEMENT
FARGO, ND

PLAN B
RED RIVER STRUCTURE

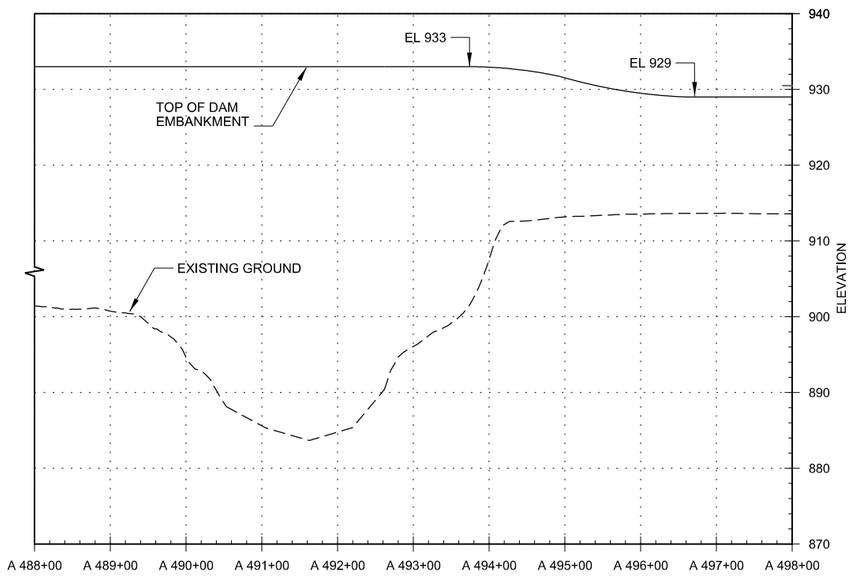
SHEET IDENTIFICATION



A2 PROFILE VIEW

EMBANKMENT DAM

0 100' 200'



A1 PROFILE VIEW

EMBANKMENT DAM

0 100' 200'

PRELIMINARY
NOT FOR CONSTRUCTION

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

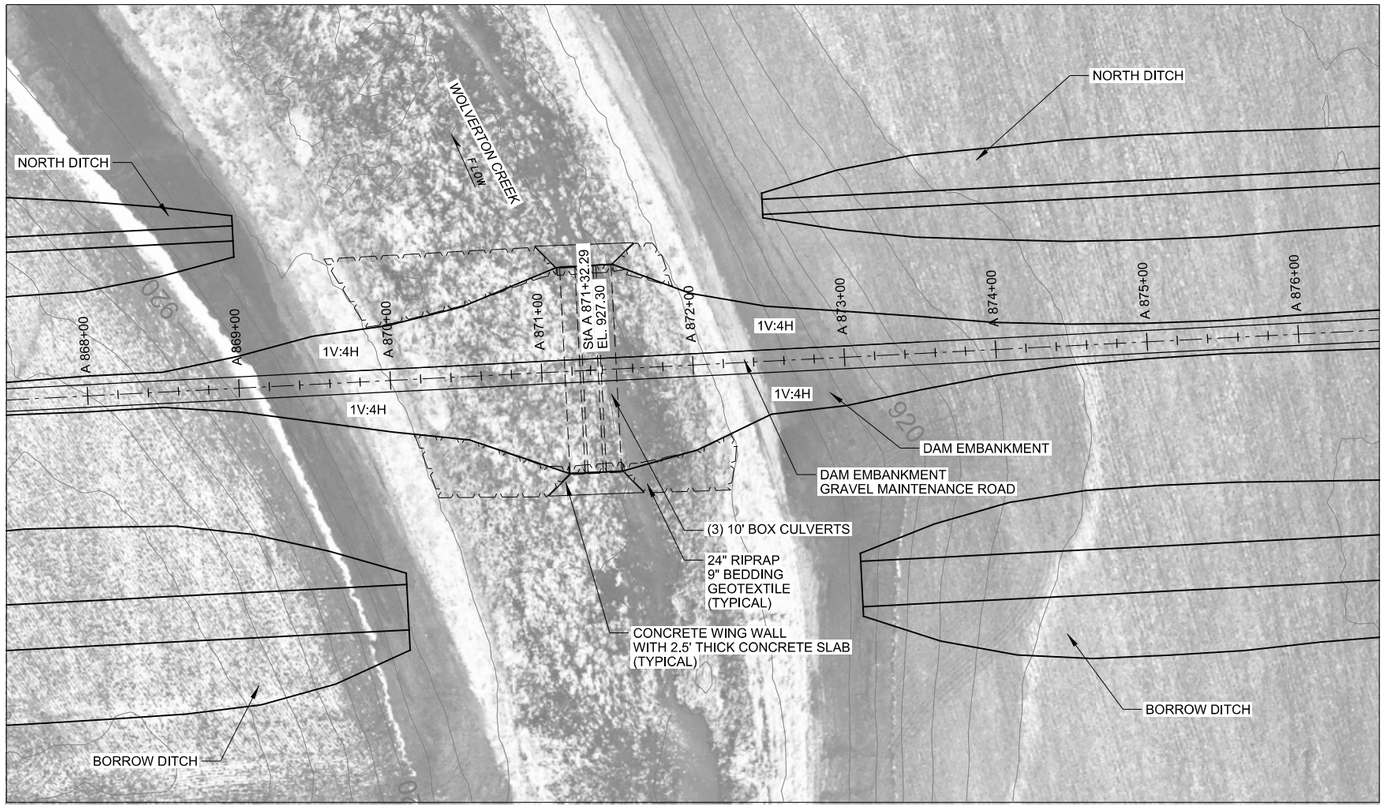
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
1" = 100'
SIZE:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT DATE:
FILE NAME: FMMFMR_RRS_PERMIT_C-PR--1.dgn
FILE NUMBER:

FMM SOUTHERN EMBANKMENT
RED RIVER OF THE NORTH RIVER BASIN
FARGO-MOORHEAD FLOOD RISK MANAGEMENT
FARGO, ND

PROFILE
RED RIVER STRUCTURE

SHEET IDENTIFICATION

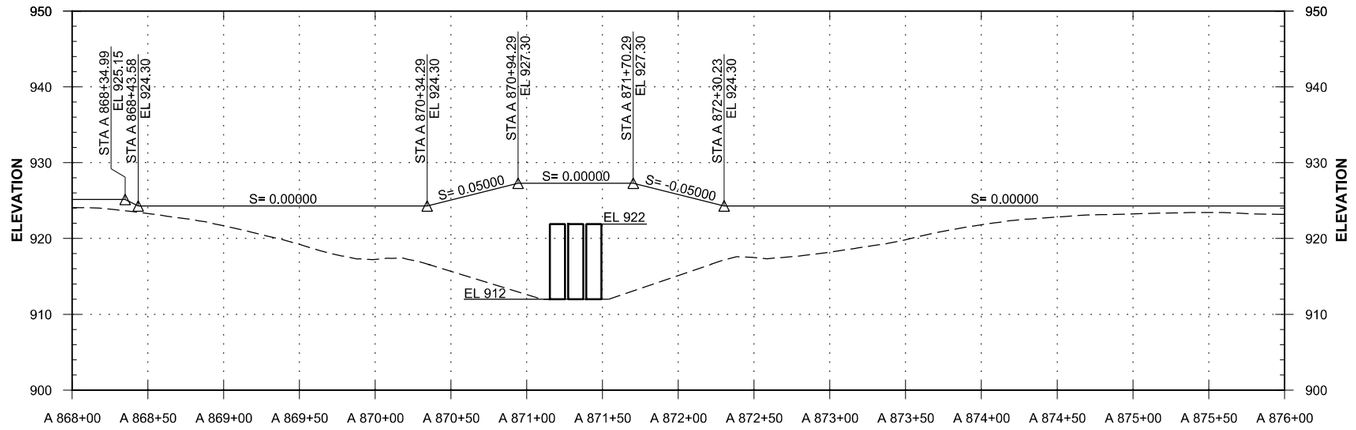


B1 PLAN VIEW

DAM EMBANKMENT CROSSING
AT WOLVERTON CREEK
SCALE: 1"=50'

0 50' 100'

N



A1 PROFILE

DAM EMBANKMENT CROSSING
AT WOLVERTON CREEK

PRELIMINARY
NOT FOR CONSTRUCTION

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
PLOT SCALE:
PLOT DATE:
FILE NAME:
SIZE:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA

FMM SOUTHERN EMBANKMENT
RED RIVER OF THE NORTH RIVER BASIN
FARGO-MOORHEAD FLOOD RISK MANAGEMENT
FARGO, ND

PLAN B
WOLVERTON CREEK

SHEET IDENTIFICATION