US Army Corps of Engineers®
St. Paul District

Appendix L: Quality Control

Fargo Moorhead Metropolitan Area
Flood Risk Management Project

Reach 7, Maple River Aqueduct

Engineering and Design Phase

Doc Version: PER-ATR

P2# 370365

12 June 2015

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Appendix L: Quality Control

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ATTACHMENTS

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Appendix L: Quality Control

L.1 GENERAL

As stated by EC 1165-2-214, all planning, engineering and scientific work will undergo a vigorous review process. Technical, scientific, and engineering information that is relied upon to support recommendations in decision documents or form the basis of designs , specifications, and/or O&M requirements will be reviewed to ensure technical quality and practical application.

L.2 REVIEWS TO BE CONDUCTED FOR FMM REACH 7

L.2.1 District Quality Control (DQC) Review

District Quality Control Reviews will be performed on all engineering and design products for the FMM Reach 7, Maple River Aqueduct Structure as required by EC-1165-2-214 and the Review Plan

L.2.2 Sponsor Review

Sponsor Reviews will be performed on the engineering and design products associated with the FMM Reach 7, Maple River Aqueduct Structure as required by the Review Plan and will be done concurrently with the ATR review.

L.2.3 Agency Technical Review (ATR)

Agency Technical Reviews will be performed on the engineering and design products associated with the FMM Reach 7, Maple River Aqueduct Structure as required by EC-1165-2-214 and the Review Plan.

L.2.4 Independent External Peer Review (IEPR)

Independent External Peer Reviews will be performed on the engineering and design products associated with the FMM Reach 7, Maple River Aqueduct Structure as required by EC-1165-2-214 and the Review Plan.

L.2.5 Lessons Learned and After Action Reviews

Prior to start of designs, Design Engineers will review lessons learned from available databases and files that are pertinent and will assure they are considered for incorporation into the engineering and design products being prepared. This includes review of past reports from VE studies and Value Based Design Charrettes to ensure that the results of those efforts are included in the design of the project features.

L.2.6 Final Product Quality Review Certifications

Upon completion of each design product or deliverable, the Project Engineer will perform a final product quality review and prepare a quality review certificate.

L.3 REVIEW DOCUMENTATION

The attachments at the end of this Appendix document the status of the reviews that have occurred and will be updated as reviews are completed and closed out.

ProjNet Summary of Reviews

Project: (FMM-PED-R7) Fargo-Moorhead Metro - Reach 7 Maple River Aqueduct

ID/Edit	Add Comments	Edit All/Note/Yours	Evaluate Pend/Concur/Other	My BackCheck Pend/Opn/Clsd	All BackCheck Pend/Opn/Clsd
0001	CRREL Ice Formation Study (Dec 03/13 to Dec 20/13)				
0002	Phase I Physical & Numeric Modeling R... (Jan 23/14 to Feb 14/14)				
0003	PER DQC - FMM Reach 7 Maple River Aqu... (May 22/15 to May 29/15) Closed for comments	39 / 0 / 0	39 / 8 / 1	0 / 0 / 0	9 / 0 / 0
0004	PER ATR - FMM Reach 7 Maple River (Jun 12/15 to Jun 26/15) Closed for comments	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0
0005	PER IEPR - FMM Reach 7 Maple River (Jun 12/15 to Jun 26/15) Closed for comments	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0
0006	PER Sponsor Review - FMM Reach 7 Mapl... (Jun 12/15 to Jun 26/15) Closed for comments	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0
0007	Maple River Aqueduct Hydraulic Modeli... (Jun 08/15 to Jun 19/15) Closed for comments	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0	0 / 0 / 0

Showing 1 to 7 of 7 entries

**NOTE: Table shows all reviews for the FMM Reach 7 Maple River Aqueduct Project Plans and Specifications. It does not include reviews for the Maple River Aqueduct Physical and Numeric Modeling Study, Ice Formation Study.

Comment Report: All Comments
Project: Fargo-Moorhead Metro - Reach 7 Maple River Aqueduct
Review: PER DQC - FMM Reach 7 Maple River Aqueduct
Displaying 48 comments for the criteria specified in this report.

Id	Discipline	Section/Figure	Page Number	Line Number
6103056	CAD-BIM	n/a	G-001	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

1 - turn off the as-built levels for the signature block.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015
Evaluation not conducted

6103057	CAD-BIM	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

There are several sheet files with reference files that are attached but turned off. Either turn on the reference attachment or detach them. examples: G-002, C-101

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015
Evaluation not conducted

6103058	CAD-BIM	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Sheet titles shall be unique. Either add stationing or Sheet x of x.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015
Evaluation not conducted

6103059	CAD-BIM	n/a	G-003	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

there are a few symbols missing in the legend. The descriptive text is there.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015
Evaluation not conducted

6103063 CAD-BIM n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

There are several reference files and rasters not found. (They are listed in red in the reference/raster manager dialog boxes.) Either include them or detach them.
examples:
C-101: raster is not found. It is lookin on Edith's hard drive.
FMMFRM_DTM_Reach6_Topo_V-SP----.dgn is missing 2 references.
FMMMRA_RDS_CivilMod_C-SP----,dgn is missing 1 reference.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103087 Hydraulics n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

In general, the H&H Appendix reads like an executive overview with little detail of hydraulic design or calculations. Many references are made to other reports without giving details of the study or output.
Page C-10 for example mensions a physical model flume study and numerical models are referenced elsewhere. A Hydraulic Optimization Report, Spillway Design Report, and VE study are also briefly mentioned as the source of design conclusions. It is unclear how many other studies have been done. Detailed references, inputs, results, and figures are not given, although the profile shown in Figure C-3 is clearly from a HEC-RAS model but this is not stated at all.

Submitted By: Thomas Gambucci (309-794-5848). Submitted On: May 29 2015

Revised May 29 2015.

1-0 Evaluation **Concurred**

Agree that the appendix as it stands now is more of an overview without design details for aspects of the project. This level of detail is intended for a 35% PER level. Several components cannot be designed further until the hydraulic modeling studies are finalized. References will be more clearly cited in the next phase.

Submitted By: Matthew Zager (309-794-5218) Submitted On: Jun 11 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6103101 CAD-BIM n/a C-101 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

1-add road footprints.
2-Add C-102 box to plan view.
3 - Add Control points

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015
Evaluation not conducted

6103102	CAD-BIM	n/a	CF101	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Stationing for Spillway should be reversed with 0+00 starting downstream.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015
Evaluation not conducted

6103103	CAD-BIM	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Add prefixes to all of the stationing excep the diversion channel to distinguish them apart.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015
Evaluation not conducted

6103104	CAD-BIM	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Plan views: add match lines, labels, slope symbols, work limits.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015
Evaluation not conducted

6103136	Hydraulics	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

H&H Appendix page C-7, sinuosity design was not explained. Downstream of Maple River aqueduct is 1.09 and upstream is 1.03.

Submitted By: Thomas Gambucci (309-794-5848). Submitted On: May 29 2015

1-0 Evaluation **Concurred**
Elaborated in the report as follows:

Downstream of the Maple River aqueduct, this 90 ft top width will be designed to meander across a 200 ft wide meander belt with a variable meander wavelength for an overall sinuosity of approximately 1.09. This geometry is consistent with reaches downstream. Upstream of the Maple River aqueduct, the diversion channel narrows to a bottom width of 210 feet. As a result, the low flow channel will be designed to meander

across a 120 ft wide meander belt with a variable meander wavelength for an overall sinuosity of approximately 1.03. This sinuosity was recommended by the Technical Memorandum "Meandering Analysis of Design Reaches 7-10 Low-Flow Channel." According to the memorandum, Scenario B with a sinuosity of 1.03 appears to provide the most confidence in stability of the centerline planform under the range of flows studied.

Submitted By: Matthew Zager (309-794-5218) Submitted On: Jun 10 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6103139 Hydraulics n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Minor Comments:
H&H Appendix
p. C-4, Error! reference source not found
C-7 informal language "really can't be any higher"
C-7 "should have at least some" should be "should have some" sinuosity.
C-8 "Figure C-." should be Figure C-3.
C-9 "Target Flow" should be "Target Flow Range"
C-13 Dimmension (spelling) (also occurs in main report page 11 of 47)
C-13 Table C-4 references table 2 instead of Table C-3.

Submitted By: Thomas Gambucci (309-794-5848). Submitted On: May 29 2015

1-0 Evaluation **Concurred**

Minor errors corrected.

Submitted By: Matthew Zager (309-794-5218) Submitted On: Jun 10 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6103257 CAD-BIM n/a CG102 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

there are several levels on the civil model that do not have weights defined.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103260 CAD-BIM n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Several alingment have stationing shown for the PC and PT. This is not needed and makes the drawing too busy. Label PIs appropriately (ie. PI-LA2)

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103264 CAD-BIM n/a CS101-CS102 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

1 -scale shown (1"=50') on the drawing does not macth the scaled defined in the sheet (1"=200')
2 - Define the location of the start/end 1V:6H slope near station 729+00.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103266 CAD-BIM n/a CS series n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

1 - cross-referencing for section F-H are incorrect.
2 - labels shall be in the model file.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103270 CAD-BIM n/a structural sheets n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

1 - Datum note is missing on several sheets.
2 - Scales or not to scale is not indicated on several sheets.
3 - where scales are indicated, scale bars are required on each sheet.
4 - Incorrect seed file used with architectural scales indicated.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

1-0 Evaluation **Concurred**

1 - Note added to all sheets
2 - Scales added to all sheets
3 - Scale bars added to all sheets
4 - Seed files are corrected

Submitted By: Quianna Dolney (651-290-5643) Submitted On: Jun 11 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6103272 CAD-BIM n/a civil model n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

verify that the overflow is drawn at the correct elevations.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103280 CAD-BIM n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

filenames:
1 -there shall be no spaces in filenames. This includes the Inroads files.
2 -suggest using the project code for the InRoads files.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103306 CAD-BIM n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Directory:
1 - Files under CAD-BIM shall be used as part of the P&S set (attached to a sheet file, etc). If not being used as part of P&S, move to design_info (FMMFRM_DTM_07_V-SP----.dgn)
2 - There seems to be some older sheet files in the structural folder. If there are being used, update file name and move to _Sheets folder. If not being used, either delete or move to design_info.
3 - InRoads files shall be under design_info. (There are some under landscape)

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103321 CAD-BIM n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Incorrect Levels:
1 - Disciplines shall match the filename and folder.
2 - there shall be no "worded" level names.
example: G-002, CS201, FMMMRA_DV_CivilMOD_C-SP----.dgn, FMMMRA_DV_Profile_S-SP----.dgn to name a few.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103326 CAD-BIM n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Filename incorrect:
1 - no more than 28 characters.
2 - Project Code required (exception if referencing files from _Overall_Project which is FMMFRM).
3 - contain the AEC 8 character portion.
4 - No Spaces
examples: FMMDR1_VICIN_SP----.dgn, G-BSDxxx.dgn (G-002), FMMMRA_Plate Layour_C-SP----.dgn, FMMMRA_alignments_50_scale_C-SP----.dgn, FMMDR7_CADASTRE_V-SP----.dgn, FMMMRA_typical_C-SC---.dgn, FMM_S-435HYD.dgn, FMMMRA_Elevation.dgn, FMMMRA_Retaining Wall.dgn.

Submitted By: Chris Afdahl (651-290-5712). Submitted On: May 29 2015

Evaluation not conducted

6103575 Environmental 14 Environmental Considerations n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Compliance with all environmental laws and regulations going forward is vague/unclear. The environmental section of the document would benefit from the inclusion of a little more detail to address: 1) is the environmental compliance for this complete/adequate (i.e., NEPA, 404, and state permits? If not, what else needs to be done prior to construction?; 2) it would be good if the specific design details that were assured within the EIS were stated or directly referenced.; 3) any specific impact concerns, known or still to be determined, should be briefly disclosed. Significance: minor.

Submitted By: Steven Clark (651-290-5278). Submitted On: May 29 2015

Evaluation not conducted

6104846 Structural n/a 28 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Paragraph 9.3.1. It would be helpful if the description of the number and size of culverts also included the width.

Submitted By: Kent Hokens (651-290-5584). Submitted On: Jun 01 2015

1-0 Evaluation **Concurred**
In paragraph 9.3.1 at the end it states that the culvert width is 33'-4".

Submitted By: Quianna Dolney (651-290-5643) Submitted On: Jun 11 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6104859 Structural n/a S-101 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

On drawing S-101 indeciferable acronyms are used to describe features. Please clarify. I personally prefer to minimimize acronoyms and use full word titles.

Submitted By: Kent Hokens (651-290-5584). Submitted On: Jun 01 2015

1-0 Evaluation **Concurred**

Wall names were changed to WALL 1, WALL 2 ...etc

Submitted By: Quianna Dolney (651-290-5643) Submitted On: Jun 11 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6104863 Structural n/a S-102 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

I realize this is a concept drawing, but if it is to scale the H-piles are too close to the edge of the concrete. Why are 14x117 piles used for the aqueduct structure? 14x73s will develop the full geotechnical capacity. Appendix F states they are to be HP14x73 so this must be a typo?

Submitted By: Kent Hokens (651-290-5584). Submitted On: Jun 01 2015

Revised Jun 01 2015.

1-0 Evaluation **Concurred**

1'-6" is the edge distance. From experience this is an ok dimension but it will be checked during final design.

The correct pile size is HP 14X73. There is a typo on sheet S-102. Will be corrected.

Submitted By: Quianna Dolney (651-290-5643) Submitted On: Jun 11 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6104894 Civil n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

CF101: Suggest distinguish control lines with unique letter prefix (i.e., A 1+00).

Submitted By: Russell Fischer (651-290-5464). Submitted On: Jun 01 2015

Evaluation not conducted

6104895 Civil n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

CG101: Add match line symbols all CG sheets.

Submitted By: Russell Fischer (651-290-5464). Submitted On: Jun 01 2015

Evaluation not conducted

6104896 Civil n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

CP104: EMB access road alignment, the curves look tight, minimum radius should match design speed. With an assumed design speed of 30 mph, you would need a 6% superelevation and a minimum radius of 275 feet (AASHTO Geometric Design Guide for Local Roads and Streets). If we are not using superelevation, our design radius would need to be larger or our design speed would need to be lowered.

Submitted By: Russell Fischer (651-290-5464). Submitted On: Jun 01 2015

Evaluation not conducted

6104984 Geotechnical n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

The DDR would greatly benefit from a review by the team members and project manager/report assembler. There are many small editorial and formatting errors. The report should also be written as "one voice". The tone and tense changes from one section to the next.

The report would also benefit from additional figures; in place of or in addition to tables or text. Examples include: A geology map and charts of the failure envelopes. Adding one to one scale figures of cross sections is also recommended.

Chapter 1 is somewhat ambiguous about what the project is. Is this the overall project intro? Example: The "Project Description" [Section 1.2] seems more like a statement of the problem.

Submitted By: John Murphy (651-290-5654). Submitted On: Jun 01 2015

Revised Jun 01 2015.

Evaluation not conducted

6104992 Geotechnical n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

It would be beneficial to make a note why there is a gap in the data on the charts of the piezo plots.

Submitted By: John Murphy (651-290-5654). Submitted On: Jun 01 2015

1-0 Evaluation **Concurred**

The data is missing due to batteries dieing. Note has been added to the plots.

Submitted By: Kurt Heckendorf (651-290-5411) Submitted On: Jun 10 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6104998 Geotechnical n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Was a deformation analysis considered in addition to the limit equilibrium analysis? At 15% strain (the failure criteria mentioned in the report) there could be very significant movement of the slope without "failure".

The rest of the analysis and geotechnical interpretation appears to meet current standards and criteria.

Submitted By: John Murphy (651-290-5654). Submitted On: Jun 01 2015

Revised Jun 01 2015.

1-0 Evaluation **For Information Only**

Some numerical analysis has been done on the diversion channel to check the LEM slope stability analysis. Deformation analysis for design the diversion channel was deemed not approipraite design method due to its complexity.

Submitted By: Kurt Heckendorf (651-290-5411) Submitted On: Jun 10 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6105002 Geotechnical n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

I didn't see much explanation about the orientation of the Maple River Spillway. The spillway intersects the diversion at a 90 degree angle. This seems like it could cause erosion damage especially if Maple River flows are very high and flows in the diversion are low.

Submitted By: John Murphy (651-290-5654). Submitted On: Jun 01 2015

1-0 Evaluation **Concurred**

Paragraph 4.3.2 Spillway Alignment Change and 4.3.3 Optimization of the 90-Degree Spillway Alignment were added to explain the change from the 45-degree spillway to the 90-degree spillway and the subsequent optimization of the alignment.

Submitted By: Richard Femrite (651-290-5550) Submitted On: Jun 12 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6105006 Geotechnical n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

I second Mr. Gambucci's comment that there are a number of reports and documents that are referenced in this report. For an outside reviewer/reader this makes it very challenging to follow what reference are included and where the other references are. Consider also pulling pertinent information from the reports into the section of this report instead of simply referencing. In 50+ years, all these reports may not be together and difficult to reference.

Submitted By: John Murphy (651-290-5654). Submitted On: Jun 01 2015

Revised Jun 01 2015.

Evaluation not conducted

6105021 Geotechnical n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

In the future, holding a review kickoff meeting or explaining the level or expectations of this review would be beneficial. I didn't know that this was a 35% submittal.

Submitted By: John Murphy (651-290-5654). Submitted On: Jun 01 2015

1-0 Evaluation **Concurred**

I can see where meeting with reviewers that have not been involved with the Fargo Project would be of benefit and will be considered in the future. A kickoff meeting with the entire review team is unlikely, but a short meeting with review team members that have not previously been involved with the project would be reasonable. In the future, if you are not clear on the level of design in the documents you are reviewing, or if you are not clear about any other aspect of the project documents or expectations for the review, I would suggest contacting the Project Manager or Technical Lead for an explanation.

Submitted By: Richard Femrite (651-290-5550) Submitted On: Jun 12 2015

Backcheck not conducted

Current Comment Status: **Comment Open**

6105298 Civil n/a CP106 & CP107 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

The access ramp for the Left Bank EMB shown on CP106 can be shifted north to avoid earthwork and road demolition to save some construction and maintenance costs.

The access ramp on the Righ Bank EMB shown on CP107 can be shifted south to avoid earthwork and road demolition to save some construction and maintenance costs.

Submitted By: Christine Moss ((651) 290-5025). Submitted On: Jun 01 2015

Evaluation not conducted

6105307 Civil n/a CF107 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Station 0+00 should be downstream at the centerline to the main diversion channel.

MVP Drafting Practices for Flood Control and Navigation Drawings states that project stationing will begin from the farthest most downstream point of the project and proceed up stream. Stationing shall read up station and be from left to right, and shall take precedence over a north orientation. Rotate the sheet so the Spillway design has north arrow facing down.

Submitted By: Christine Moss ((651) 290-5025). Submitted On: Jun 01 2015

Evaluation not conducted

6105331 Civil n/a CP103 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

The turning movement from LB to RA is difficult to make. Is that the reason for the cul-de-sac turn around?

Submitted By: Christine Moss ((651) 290-5025). Submitted On: Jun 01 2015

Evaluation not conducted

6105338 Civil n/a CS101 n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Vertical curve design is required for maintenance road where overflow is constructed in EMB on the 1V:6H slope. Maximum 10% slopes for roads.

Submitted By: Christine Moss ((651) 290-5025). Submitted On: Jun 01 2015

Evaluation not conducted

6105359 Civil n/a n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Courtesy comments are attached.

(Attachment: FMM_REACH7_35_05-29-15_CRM_Comments.pdf)

Submitted By: Christine Moss ((651) 290-5025). Submitted On: Jun 01 2015
Evaluation not conducted

6105803	Survey	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Minor comments have been provided to the designer as red lines on a drawing set.

Submitted By: Eduardo Torrens (651-290-5596). Submitted On: Jun 01 2015
Evaluation not conducted

6117332	Other	Table of Contents	v and vi	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Comment by Carrie Vuyovich, CRREL: Is the "Debris/Ice Barrier Structure" the same as the "Ice Retention Structure"?

Submitted By: Bill Csajko (651-290-5853). Submitted On: Jun 09 2015
Evaluation not conducted

6117338	Hydraulics	2.2.7 Project Features - Ice Retention Structure	9	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**
[**Critical/Flagged.**]

Comment by Carrie Vuyovich, CRREL: "The presence of the spillway increases the water surface gradient and flow velocities just upstream of the spillway, thereby increasing the likelihood of ice movement and an ice jam." - This statement is confusing as written. Typically we think of ice jams forming in slow moving reaches with a mild gradient downstream of a steep reach. It also disagrees with the CRREL report where it says, "At location B, just upstream of the spillway, the slowly meandering natural channel opened up to the large spillway area and the flow slowed considerably. This led to a jamming location, as floes under-turned in recirculating, slowed flow." Since this is the Project Features section, I would suggest discussing the Ice Retention Structure here. If the design has not been chosen then discuss likely locations and why it is necessary

Submitted By: Bill Csajko (651-290-5853). Submitted On: Jun 09 2015

Revised Jun 09 2015.

Evaluation not conducted

6117347	Other	5.7 Outstanding Issues/Continuing Design Tasks - Debris/Ice Barrier Structure	19	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**
[**Critical/Flagged.**]

Comment by Carrie Vuyovich, CRREL: "ice retention structures was recently developed by CERL (see Appendix M)." Should be CRREL, not CERL. Consider changing "Debris/Ice Barrier" to "Ice Retention" to be consistent throughout the report (See comment on Section 2.2.7)

Submitted By: Bill Csajko (651-290-5853). Submitted On: Jun 09 2015

Evaluation not conducted

6117351	Hydraulics	6.2.7 Hydrology and Hydraulics - Ice Retention Structure	23	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Comment by Carrie Vuyovich, CRREL: This is the same exact paragraph as in section 2.7. See comment on Section 2.2.7. I would suggest expanding this section to discuss how the spillway and engineered channel affect river ice; both when the spillway is activated and not; why it is necessary to install an ice control structure upstream; and how you expect that structure to affect hydraulics.

Submitted By: Bill Csajko (651-290-5853). Submitted On: Jun 09 2015

Revised Jun 09 2015.

Evaluation not conducted

6117353	Structural	9.4.6 Structural Engineering - Debris/Ice Barrier Structure	30	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Comment by Carrie Vuyovich, CRREL: This is the same exact paragraph as in section 5.7. See comment on Section 5.7. Should be CRREL, not CERL. Consider adding additional details about the proposed structures and their design.

Submitted By: Bill Csajko (651-290-5853). Submitted On: Jun 09 2015

Evaluation not conducted

6117356	Hydraulics	C.2.7 Appendix C - Hydraulics and Hydrology, Ice Retention Structure	C-11	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Comment by Carrie Vuyovich, CRREL: Same exact paragraph as sections 2.7 and 6.2.7. Since this is the H&H appendix I think there should be more details about the potential ice problem (as determined by the physical model and historical analysis), and the proposed ice retention designs here. There should be more background on why this structure is necessary and (especially here in the appendix) details on how that was determined.

Submitted By: Bill Csajko (651-290-5853). Submitted On: Jun 09 2015

Evaluation not conducted

6117360	Other	F.1.3.6 Appendix F - Structural Design & Criteria, Debri/Ice Barrier Structure	F-8	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Comment by Carrie Vuyovich, CRREL: This is the same exact paragraph as in section 5.7. See comment on Section 2.2.7. Should be CRREL, not CERL. Debris is spelled wrong in heading.

Submitted By: Bill Csajko (651-290-5853). Submitted On: Jun 09 2015

Evaluation not conducted
