

Boyd Irrigation Company
1100 10th Street, Suite 300
Greeley, Colorado 80631

Roger Schmidt
President
970-371-3728

Eric Reckentine
Vice-President

Rachel Borum
Secretary/Treasurer
970-350-9812

Danielle Snyder
Director

March 17, 2017

Mr. Peter Hayes
Division of Reclamation, Mining & Safety
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, CO 80203

RE: 83rd Joint Venture; ID # M-1992-069

Dear Mr. Hayes:

I am writing on behalf of the Boyd Irrigation Company ("BIC") concerning the above-referenced sand and gravel mine. I am writing in response to your inspection report, issued on December 14, 2016, and the response from Aggregate Industries ("AI") dated January 12, 2017.

Attached to this letter is supplemental information from Wright Water Engineers, Inc. ("Wright Water") that responds to the two above documents on the technical issues. In addition, I want to note the following:

1. It is admitted by all parties that the erosion on the west bank of the above-referenced sand and gravel mine caused the breach of the pipeline owned by BIC and the erosion damage to the F Street agricultural field owned by the City of Greeley. See, for instance, the last sentence on the first page of the letter from Tetra Tech, AI's consultant, which states:

"We agree that the increased flow velocities led to the erosion of the reclamation slope, hence the breach of the pipeline and the erosion of the F-street Agricultural Field."

See also the report from Wright Water, attached, which confirms and supports this conclusion as well as responds to the various other comments from AI and Tetra Tech. Thus, it is undisputed that the failure to properly protect the reclaimed slope from erosion has resulted in damage to the property owned by BIC.

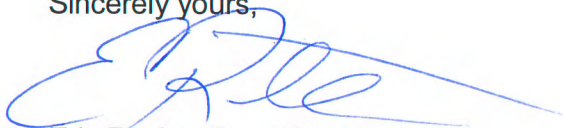
2. AI's legal responsibility to properly protect reclaimed property from erosion and adjacent properties from damage is also clear. See, for instance, Section 34-32.5-116(4)(j) Colorado Revised Statutes which states "all surface areas of the affected land, including spoil piles, shall be stabilized and protected so as to effectively control erosion." See also subsection (4)(i) of the same section, which states "areas outside of the affected land shall be protected from slides or damage occurring during the mining operation and reclamation." The DRMS is charged with insuring that the permittee complies with these statutory mandates. AI and Tetra Tech assert that AI complied with the permit conditions, but all parties agree that the eroded western slope of the pit resulted in damage to BIC's property. Thus, it is clear that AI has not satisfied its legal obligation to protect adjacent properties.
3. BIC is confused by AI's statement at the top of page two of the letter dated January 12, 2017, first full sentence that states: "No other improvements throughout the rest of the relocated ditch were requested by the City/Boyd." To the extent that AI believes that BIC had to specifically request AI to appropriately armor the slope of its gravel pit to prevent erosion and resulting damage to BIC property, AI is obviously mistaken. As demonstrated in the Wright Water report dated September 2, 2016 and above, both the permit and state statutes require AI to protect the banks from erosion and resulting damage to adjacent property owners. AI has an independent obligation to do this.

To address the erosion resulting from AI's pit embankment, BIC requests the DRMS to require AI to:

- a. Stabilize the unstable and eroded gravel pit embankment
- b. Repair the pipeline carrying water for BIC back to its original design
- c. Reimburse BIC for \$1 million plus in repair costs incurred to date

Because the last time we met, BIC's technical consultant, Ian Paton, P.E. of Wright Water, was not available, we request to schedule a meeting as soon as possible so that Mr. Paton can attend, explain his findings and conclusions, and answer any questions.

Sincerely yours,



Eric Reckentine, Director
Boyd Irrigation Company

cc. Christie Coleman, P.E. Boyd Irrigation Company
Jeff Kahn, Counsel, Boyd Irrigation Company



Peter Hayes
Division of Reclamation, Mining & Safety
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, CO 80203

March 17, 2017

RE: 83rd Joint Venture; ID # M-1992-069

Dear Mr. Hayes:

I am writing on behalf of the City of Greeley in reply to the Division of Reclamation, Mining & Safety's ("DRMS") December 14, 2016 inspection report and the January 12, 2017 response to that report from Aggregate Industries ("AI"). The City endorses the March 17, 2017 letter written to the DRMS by Eric Reckentine on behalf of the Boyd Irrigation Company ("BIC").

In addition to the latest letter from the BIC and the accompanying report from Wright Water Engineers, Inc. ("WWE"), you also have complaint letters dated May 27, 2016 from both the City and BIC, as well as WWE's initial report. I will not repeat the information you already have, but rather will add those concerns specific to the City.

The significant erosion damage to the City's F Street agricultural property was, undeniably, caused by AI's operations. AI admits that. The January 11, 2017 report from AI's consultant, Tetra Tech states: "We agree that the increased flow velocities led to the erosion of the reclamation slope, hence the breach of the pipeline and the erosion of the F-Street Agricultural Field."

AI's operations produced an immense ravine cutting across the City's property. In the long term, if this ravine continues to expand it could rechannel the Cache la Poudre River and flood City neighborhoods. In the shorter term, the City has suffered damages in the amount of \$470K, which is the cost to restore the City's eroded property to its previous, undamaged condition.

It is our expectation that DRMS will require AI to restore the City's F Street property to the condition that would have existed if not for AI's operations. And, that the DRMS will require AI to perform the stabilization work requested by the BIC to prevent future erosion from occurring.

C.R.S. §34-32.5-116(4)(i) and (j) hold AI responsible for proper protection of its own as well as the City's property from this erosion damage. The City is relying upon the DRMS to ensure that AI complies with that statutory responsibility.

Sincerely yours,

A handwritten signature in blue ink, appearing to be 'Burt Knight', with a stylized, flowing script.

Burt Knight, Director of Water and Sewer

cc: Eric Reckentine, Director, BIC
Christie Coleman, P.E., BIC
Jeff Kahn, Counsel, BIC



Wright Water Engineers, Inc.

2490 West 26th Ave., Suite 100A
Denver, Colorado 80211
(303) 480-1700 TEL
(303) 480-1020 FAX

www.wrightwater.com
e-mail:ipaton@wrightwater.com

March 15, 2017

Via email: roger.schmidt@greeleygov.com

Mr. Roger Schmidt
President, Boyd Irrigation Company
1100 10th Street, Suite 300
Greeley, Colorado 80631

Re: Response to Comments Provided by the Division of Reclamation, Mining and Safety and Aggregate Industries Regarding the 83rd Joint Venture Pit

Dear Mr. Schmidt:

This letter, prepared by Wright Water Engineers, Inc. (WWE) on behalf of the Boyd Irrigation Company (BIC), addresses the BIC's flood damaged pipeline for the Boyd-Freeman Ditch. The damaged pipeline section is located north of F Street and west of the 83rd Joint Venture gravel pit owned by Aggregate Industries.

The information in this letter supplements an initial letter report prepared by WWE on this subject, dated September 2, 2016 and titled "*Engineering Evaluation of Nature and Causes of Erosion in Agricultural Field Adjacent to Boyd Irrigation Company Pipeline and Damage to Pipeline.*" That report provides a description of the factors and events that contributed to the damage of the BIC pipeline on three occasions, from 2010 through 2014, and the subsequent repairs that were made by the BIC. The September 2016 WWE report also includes a chronology of events which is included with this letter for reference (see Appendix A). It is noteworthy that the most recent repair by the BIC, which was completed in 2016, was *after* the most recent flood event that damaged the BIC pipeline, which occurred in 2014. The timing of the 2016 repair is relevant to the discussion below.

Individuals involved with the preparation or review of the September 2016 WWE letter report and this letter are Ian Paton, P.E. and Jonathan Jones, P.E. from WWE and Ben Urbonas, P.E. (outside reviewer to WWE). Specifically, this letter was prepared by WWE in response to:

- 1) The *Minerals Program Inspection Report* prepared by the Colorado Division of Reclamation, Mining and Safety (DRMS), signed on December 14, 2016, which was written following an inspection conducted on July 12, 2016.
- 2) A letter from Aggregate Industries (AI), dated January 12, 2017, titled, "*Permit M-1992-069 – 83rd Joint Venture Pit, July 12, 2016 Inspection (Signature Date December 14, 2016), Corrective Action Response*" which also has an attached letter from Tetra Tech (engineering consultant to Aggregate Industries), dated January 11, 2017, titled "*Colorado Division of Reclamation and Mining Safety Facility Inspection on July 12, 2016 (signature date*

December 14, 2016) and Wright Water Engineers, Inc. Letter to City of Greeley dated September 2, 2016.”

WWE’s responses incorporate information from our initial investigation and also include information obtained in the past month, including:

- 1) Observations made by Ian Paton, P.E. during a field visit to the location of the pipeline breach, conducted on February 6, 2017.
- 2) Information gained from interviewing City of Greeley personnel who are tasked with operating and maintaining the pipeline that was breached.
- 3) Findings from interviewing the engineer responsible for the design of the subject pipeline as well as for construction observation.
- 4) Photographs of the area of interest taken on May 27, 2014 at the early stages of the flood event that damaged the pipeline and caused the erosion in the field west of the pipeline.

The responses from WWE address the DRMS inspection report, the AI comment letter and the Tetra Tech comment letter, in that order.

Comments on the DRMS Inspection Report, signed December 4, 2016

The DRMS Mineral Program Inspection Report documents the inspection of the 83rd Joint Venture Site that was conducted on July 12, 2016. Participants in the inspection were Mr. Peter Hays and Mr. Wally Erickson with the DRMS, Ms. Connie Davis and Mr. Mike Refer with AI, and Ms. Christie Coleman and Mr. Eric Reckentine with the City of Greeley.

DRMS letter, p.2 , last paragraph:

The DRMS letter text states, *“The pipeline was not operational at the time of the inspection due to leaking joints in the pipeline. The joints were scheduled to be repaired soon. Groundwater was flowing from the manhole and vault located in the reconstructed portion of the pipeline.”*

WWE Comment:

For clarification, it is important to note that the section of pipeline noted as being non-operational due to leaking joints is just the section of pipe (an inverted siphon) that was installed in 2016 to temporarily repair the portion of pipeline damaged in 2013 and 2014. The original portion of the pipeline that was not damaged in 2014 is still intact and has no evidence of leakage.

DRMS letter, p. 3 , last paragraph:

“At this time, evidence collected during the Division’s investigation appears inconclusive.”

WWE Comment:

We respectfully believe that the findings are conclusive regarding the mechanism that caused the pit embankment to erode and damage the pipeline owned by the BIC. Both WWE and TetraTech agree that the increased velocity of flows running down the pit embankment caused the embankment to erode (the bottom of page 1 of TetraTech’s comments states, *“We agree that the increased flow velocities led to the erosion of the reclamation slope, hence the breach of the pipeline and erosion of the F-Street Agricultural Field.”*) The increased velocity of the flow on the embankment resulted in erosional headcutting that damaged the pipeline and, in 2014, caused erosion in the field west of the pipeline.

If the pit reclamation slope had been sufficiently armored to protect against erosion, then the erosion and headcutting would not have occurred, or at least would have been significantly reduced. Because the pit is located in a mapped floodplain, having shallow flooding from the Cache La Poudre River running overland and into the AI pit is not unexpected.

DRMS Letter, attached photographs:

First photograph: View of repaired Boyd Freeman Ditch looking east into the 83rd Joint Venture Site

WWE Comment:

For clarification, note that the leaking manhole shown in the first photograph in the attachment to the DRMS letter is part of the project completed in 2016 to temporarily repair the breached portion of the pipeline for the Boyd Freeman Ditch. The photograph of the manhole is a section of the temporary pipeline that was completed after the 2013 and 2014 breaches occurred and which is in a completely different configuration than the pipeline that was breached.

Comments on the AI Letter, dated January 12, 2017

AI letter, p. 1, third paragraph:

The AI letter discusses a proposal by AI in 2006 to install a piped section in the ditch to accommodate an access road at the east end of the north boundary of the site. The AI letter also includes several attachments related to this piped section, including three letters from 2006

between AI and the City/BIC, as well as a calculation sheet and specifications related to the 2006 project.

WWE Comment:

For clarification, the 2006 project referenced in the AI letter and in the attached correspondence is at the northeast end of the AI pit (see Figure in Appendix C). This location is separated by roughly 1,800 feet from the location where the ditch failure occurred in 2010 and where the pipeline breaches occurred in 2013 and 2014. In addition, the Boyd-Freemen Ditch was relocated by AI to its current alignment sometime between 1999 and 2001 (based on aerial imagery), which was several years before the referenced 2006 project took place.

AI letter, p. 2:

The AI letter (p. 2, first paragraph) also states, *“No other improvements throughout the rest of the relocated ditch were requested by the City/Boyd.”*

WWE Comment:

Only after the high flows in the Cache La Poudre River occurred in 2013 and 2014 was the insufficient erosion protection on the embankment of the AI gravel pit finally identified. These events demonstrated that the erosion protection on the AI Pit’s western slope is not sufficient to protect the slope from major erosion when a flooding event causes shallow overland flow in the Cache La Poudre floodplain to flow down into the pit.

Comments on the Tetra Tech Letter, dated January 11, 2017

Tetra Tech letter, p. 1, last paragraph, last sentence:

“We agree that the increased flow velocities led to the erosion of the reclamation slope, hence the breach of the pipeline and erosion of the F-Street Agricultural Field.”

WWE comment:

WWE and Tetra Tech are in agreement that the cause of the erosion of the reclamation slope is increased flow velocity. The eroding slope of the AI pit caused the breach of the pipeline and, in 2014, the erosion of the F Street Agricultural Field.

Tetra Tech letter, p. 2, second paragraph:

The Tetra Tech letter raises questions about the suitability of the pipe selected for the inverted siphon application. The text states, *“The actual pipe installed if not properly backfilled and joint*

restrained would be susceptible to leakage at the joints that can lead to erosion around the pipe and subsequent settlement above the pipe.”

WWE Comments:

- The amount of water pressure in the inverted siphon pipe section in question is approximately 4 to 5 pounds per square inch (psi). The 48-inch diameter DuroMaxx pipe used for the project (manufactured by ConTech) is made from steel-reinforced high density polyethylene (HDPE) and is rated to withstand up to 8.5 pounds per square inch continuously for 50 years and up to 12.0 psi for 9 months. The High Performance bell and spigot connection with gasket is rated to 15 psi. Consequently, both the pipe and the pipe connections are rated to withstand the pressures that would have been observed within the pipeline.
- Anderson Consulting Engineers, Inc. (Anderson) is recognized to be a well-established, competent and experienced engineering firm. A discussion with Scott Parker, P.E., the Anderson design engineer, found that the construction of the pipeline, including the pipe connections, went well and that a representative from the pipe manufacturer also came to the project site during installation of the pipe. Thrust blocks were not identified as necessary for the pipeline configuration.
- Roger Schmidt, BIC President, who is responsible for maintaining and operating the pipeline, was interviewed and stated there was no known evidence of leakage from the pipe, nor was there any indication of settlement above the pipe, between the time the pipeline was installed in 2012 until the time that the pipeline was first breached by erosion in 2013. It was also stated that during the periods of time when the pipeline had water flowing in it, City employees were inspecting conditions along the pipeline at least two times per day. In addition, there are no known reports of AI contacting BIC to identify leakage from the BIC pipeline into the AI pit.
- Photos taken by Roger Schmidt, BIC President, on May 27, 2014 during the early stages of the 2014 flood event, show a broad sheet of flow reaching the top of the pit's embankment and starting to flow down into the pit (see photos in Appendix B to this letter). The photos do not show a distinct location with settlement in the pipeline that caused flows to concentrate down the embankment.
- Although there is no indication that the pipeline was leaking, if leakage had occurred, the native material in the area of the pipeline has high hydraulic conductivity (in accordance with the geotechnical engineering analysis for the site conducted by Olsson and Associates in October 2014 for pipe repairs, the material is generally sand with gravel and cobbles, overlying shale bedrock). Leakage

from the pipeline, had it occurred, would have drained down and away from the pipe and into the AI gravel pit.

Tetra Tech letter, p. 2, second paragraph, last sentence:

“The pipeline was not operational at the time of the inspection due to leaking joints in the pipeline.”

WWE comment:

The pipeline referenced in the comment is not relevant to the issue being addressed. The pipeline that the comment refers to is the new temporary inverted siphon that was completed in 2016; it is an interim repair until a permanent fix can be made to the permanent pipeline. There is no disagreement that the temporary pipeline is leaking. However, since the temporary pipeline did not exist at the time when the most recent breach of the permanent pipeline occurred, in 2014, it is not related to this discussion.

Tetra Tech letter, p. 3, third paragraph, first sentence:

“In summary, we believe AI is in compliance with their permit.”

WWE comments:

Regarding AI being in compliance with their permit, WWE’s opinion is summarized as follows:

- The AI pit was in compliance with the following specific terms of their permit:
 - The embankment slopes are not steeper than 3:1
 - The embankment slopes were generally well vegetated.
- The AI pit was not in compliance with other specific terms of their permit:
 - *Permit Application to DRMS, 83rd Joint Venture (June 4, 1992) (Regular Operation 112 Reclamation Permit).*
 - In the permit application to DRMS from the 83rd Joint Venture, dated June 4, 1992, for the Regular Operation 112 Reclamation Permit, the application states in the Notice to Commenters/Objectors: *“This mining operation will not adversely affect the stability of any significant, valuable and permanent man-*

made structure(s) located within two hundred (200) feet of the affected lands.”

For reasons outlined in the WWE letter report dated September 2, 2016, the AI mining operation was the reason the original alignment of the Boyd-Freeman Ditch was rerouted to its current configuration. The gravel mining operation created a pit that was susceptible to erosion and headcutting when exposed to flood flows in the mapped floodplain. Those flood flows resulted in erosion of the pit embankment and subsequent headcutting that caused damage to the pipeline in 2013 and 2014 and erosion in the agricultural field in 2014.

Tetra Tech letter, p. 3, third paragraph:

The origin of the 2013 erosion that led to the breach and damage to the pipeline could have been caused by three modes of failure: 1) Simple sheet flow down the reclamation slope, 2) Leaky joints in the 48-inch inverted siphon that resulted in settlement above the pipeline, or 3) the removal of the 15-inch CMP [i.e., corrugated metal pipe] that resulted in uncontrolled overtopping of the reclamation slope.”

WWE comments:

The three possible modes of failure identified in the Tetra Tech letter are each evaluated and discussed below:

- Simple sheet flow down the reclamation slope

WWE comment:

Sheet flow down the reclamation slope is the only mode of failure that is supported with evidence based on the information we have reviewed. Photos of water flowing over the crest of the embankment, taken during the early stages of the 2014 flood event, show evenly distributed sheet flow as it reaches the crest of the pit’s embankment.

- Leaky joints in the 48-inch inverted siphon that resulted in settlement above the pipeline.

WWE comment:

No evidence of pipe leakage or settlement was observed by personnel from the City of Greeley who are responsible for pipeline operations and maintenance. The pipeline operations and maintenance personnel typically conduct at least two visits per day along the pipeline alignment when water is flowing. In addition, the

pipeline was designed by a competent engineer with additional oversight during construction provided by the pipe manufacturer.

- The removal of the 15-inch CMP that resulted in uncontrolled overtopping of the reclamation slope

WWE comment:

The capacity of a 15-inch diameter corrugated metal pipe (CMP) (roughly 3 to 4 cfs in this installation) is not significant compared to the flow rate across the field when the Cache La Poudre River overtopped its banks in 2013 and 2014 (likely several hundred cfs). Neither the presence nor the absence of a 15-inch CMP would have made a difference in terms of the embankment being overtopped when major flooding is occurring in the Cache La Poudre River floodplain.

Tetra Tech letter, p. 2, last paragraph, last sentence:

“The reclamation slope in the area of the breach should be armored to protect from future floods.”

WWE comment:

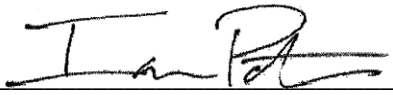
We agree that the reclamation slope should be armored to protect from future floods. Armoring the slopes of gravel pits for protection from erosion if susceptible to flooding is consistent with design criteria developed by the Urban Drainage and Flood Control district (UDFCD) for gravel pits located in floodplains. However, instead of limiting the armoring to the area of the existing breach, the extent of the armoring should be determined based on the projected flow rate for a specific design storm event. Consequently, the extent of the armoring on the reclamation slope may need to extend beyond the current breach opening. In addition, the areas of erosion damage on the F Street Property also need to be filled in and repaired.

WWE appreciates the opportunity to provide responses to comments received regarding the nature and causes of erosion that resulted in damage to the pipeline and the adjacent agricultural field. This response letter has been prepared based on the information listed above, information gained from our field visits and discussions with City of Greeley personnel familiar with the site, and from discussing the project with the engineer responsible for the pipeline’s design and construction. If additional information becomes available, we may need to update our findings.

Please feel free to contact us with any information regarding this report.

Sincerely,

WRIGHT WATER ENGINEERS, INC.

By _____

Ian Paton, P.E.

Certified Floodplain Manager (CFM)

Certified Professional in Erosion and Sediment Control (CPESC)

President / Senior Water Resources Engineer

By _____

Jonathan Jones, P.E.

Diplomate, Water Resources Engineer (D.WRE)

Chief Executive Officer

Cc: Ben Urbonas, P.E., D.WRE

Attachment(s)/Enclosure(s):

Appendix A – Chronology of Events

Appendix B – Photolog from May 27, 2014

Appendix C – Overview Map

Appendix A

Chronology of Events

Chronology of Conditions and Events at the Boyd-Freeman Ditch and AI Pit

Year / Time Frame	Description of Conditions / Events
Prior to development of Aggregate Industries (AI) gravel pit in 1999 to 2001.	<ul style="list-style-type: none"> • The AI gravel pit location was formerly grazed prairie land use. (See Appendix B, Figure B.12, which shows the conditions that existed at the location of the AI gravel pit in October 1999, prior to the AI gravel pit being constructed). (See Note 1 at bottom of table regarding Appendix B). • When built, the AI gravel pit was in unincorporated Weld County. • A Special Review Permit was issued for the gravel pit by Weld County on October 21, 1992. The permit required grading to provide stabilized shoreline around the lakes and grading to control erosion. (Note that the AI gravel pit is now located within the Greeley City limits).
1999 to 2001 (sometime in this period, based on aerial imagery)	<p>The Boyd-Freeman Ditch was relocated by AI to its current alignment:</p> <ul style="list-style-type: none"> • The original ditch alignment had a direct path through the current location of the gravel pit. • The ditch was realigned to allow more space for expanded gravel pit operations. • Construction of the ditch realignment was performed by AI. • The ditch remained as an open channel conveyance in its new alignment. • No known engineering design/drawings exist for the realignment project.
2007	<ul style="list-style-type: none"> • The last excavation occurred at the AI pit (per AI annual Division of Reclamation, Mining and Safety [DRMS] report, Feb. 2015).
2010 (June)	<ul style="list-style-type: none"> • A ditch failure/breach occurred where the ditch turns from west/east to south/north.
2011-2012	<ul style="list-style-type: none"> • BIC makes repairs to the ditch failure/breach that occurred in June 2010. • The Iverson/Martin Marietta gravel pit was developed on the west side of the bike path, east of the Cache La Poudre River.
2011-2012	<ul style="list-style-type: none"> • The open channel Boyd-Freeman Ditch was replaced with 48-inch HDPE pipe (Note: drawings show PVC pipe, but HDPE was ultimately used) <ul style="list-style-type: none"> ○ Design drawings were prepared for BIC (April 2011). ○ Engineering and construction was performed and paid for by the BIC. ○ Approximate cost of repairs: \$720,000.

Year / Time Frame	Description of Conditions / Events
2013 (September)	<ul style="list-style-type: none"> • Flooding causes flow to overtop the Cache La Poudre bank, flood the F Street agricultural field and breach the Boyd-Freeman Ditch embankment and the pipeline. <ul style="list-style-type: none"> ○ A section of pipeline is breached and washed out. ○ Repairs to the pipeline were made by and paid for by the BIC, including on the east side of the pipeline embankment (AI side). The cost of the repairs was approximately \$80,000. ○ The location of the damage and repairs was the same general location as where the major pipeline breach later occurred in 2014. ○ No headcut formed on the F Street agricultural field in 2013.
2014 (June)	<ul style="list-style-type: none"> • Flooding causes flow to overtop the Cache La Poudre bank, flood the F Street agricultural field and breach a section of the Boyd-Freeman Ditch pipeline and its embankment. <ul style="list-style-type: none"> ○ Major deposition of eroded material occurs on the east side (AI side) of the pipeline breach. ○ Major erosion/headcutting occurred on the F Street agricultural field. ○ The headcut advanced from the breach through the F Street agricultural field and to within approximately 150 feet east of the concrete path located east (on outside bend) of the river.
2015	<ul style="list-style-type: none"> • The City/BIC contracted with Olsson Associates to develop a design for temporary repairs associated with the breached pipe embankment. The temporary repairs include the following: <ul style="list-style-type: none"> ○ Riprap armor across the width of the breach which remains open. ○ Installation of a new siphon for the pipeline below the grade of the breach invert. ○ Installation of sheet pile across the width of the breach. ○ (Note: The temporary repairs described above will be removed after repairs and regrading of the F Street property occurs and the pipeline is restored to its historic grades). • In addition to the temporary repairs at the embankment breach location, the City also installed sheet piling on the eastern side of the concrete bike path to protect against future headcutting advancing to the west of the bike path. • Total cost for both projects (breach repair and installation of sheet piling at bike path): approximately \$900,000.

Year / Time Frame	Description of Conditions / Events
2015 (May)	<ul style="list-style-type: none"> • A breach occurs in the west side of the Iverson/Martin Marietta Pit, forming a direct connection between the river and the pit. During a field visit on June 22, 2015, flow from the Cache La Poudre River was split roughly in half between the river channel and flow through the pit. • Three exit points exist for water flowing from the Iverson/Martin Marietta Pit to return to the river. Two of the exit points direct flow eastward, across the Boyd-Freeman Ditch wasteway toward the F Street agricultural field. The third exit point directs flow from the east side of the pit northward into the river.
2016 (January)	<ul style="list-style-type: none"> • Construction completed for sheet pile installation along bike path.
2016 (August)	<ul style="list-style-type: none"> • Construction complete for the breach repair work.

Notes:

- (1) This chronology of events is from the letter report by WWE dated September 2, 2016. The reference to Appendix B is for an appendix of aerial photos attached to that letter report.

Appendix B

Photolog – May 27, 2014

**Photographs from Boyd-Freeman Ditch Area
(Photos by Roger Schmidt May 27, 2014 – Early Stage of 2014 Flood Event)**



Photo B.1 - View south along embankment of AI pit with water beginning to flow over the embankment.

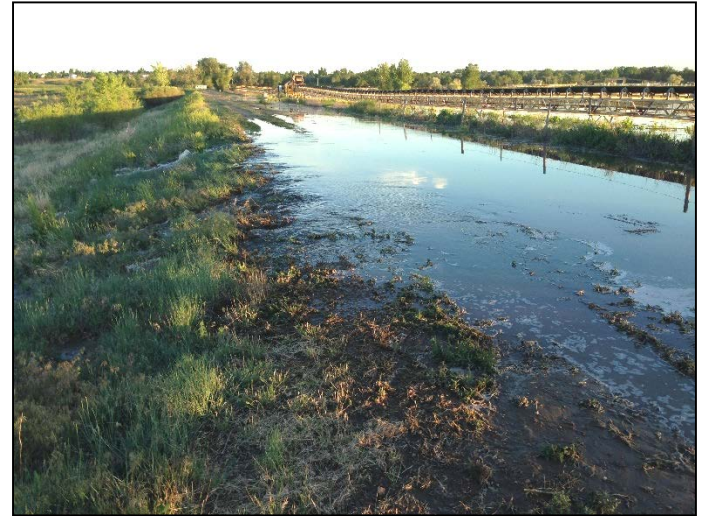


Photo B.2. View south along embankment of AI pit with water beginning to flow over the embankment.



Photo B.3 - View south along pipeline alignment with AI pit on left and F Street agricultural field on right, with water beginning to flow over the embankment.

Appendix C

Overview Map



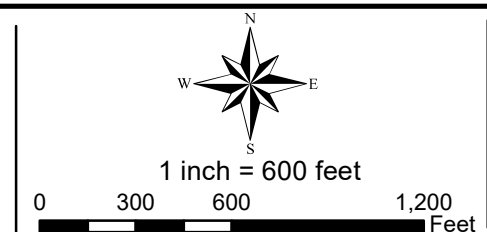
Path: E:\Boyd Ditch Overview Map_Gina.mxd

WWE
WRIGHT WATER ENGINEERS, INC.
2490 W 26TH AVE 100A
DENVER, CO. 80211
(303) 480-1700

WELD COUNTY, COLORADO

**BOYD-FREEMAN DITCH AND F ST. PROPERTY
OVERVIEW MAP**

SECTIONS 34 & 35, TOWNSHIP 6N, RANGE 66W, 6TH PM



PROJECT NO.
151-039.000

FIGURE
1