TOWN OF OAK CREEK

P.O. Box 128 • Oak Creek, Colorado 80467 • (970) 736-2422

March 20, 2017

Jonathan Hernandez
Colorado Water Board Conservation
1313 Sherman Street, Room 718
Denver, CO 80203

via e-mail jonathan.hernandez@state.co.us

RE: Sheriff Dam – Dam Inundation Mapping
Purchase Order Number POGG1 2017-394

Dear Mr. Hernandez:

The Town of Oak Creek (Town) has completed the Sheriff Dam Inundation Mapping Project, and by this letter is submitting for reimbursement of $9,178.40 (93%) of the associated costs pursuant to the above referenced purchase order.

Also included with this letter is:

1. A copy of the engineer's invoice showing total and final project costs in the amount of $9,869.25;
2. A copy of the Town's check in payment of the total and final project costs in the amount of $9,869.25;
3. A copy of letter of approval of the project from Dana Miller, Dam Safety Engineer, Dam Safety Branch, Colorado Division of Water Resources;
4. A copy of the stamped and signed Final Report from W.W. Wheeler; and
5. Copies of the inundation maps.

This letter as well as the items noted above are being provided electronically to your email as requested.

Let us know if you need any additional information.

Sincerely,

Mary Alice Page-Allen
Town Administrator/Clerk

xc: file

OK to Pay $9,178.40
Contract/PO# D0661 2017-394
Jonathan Hernandez 3/20/17
Date

1ST AND FINAL PAYMENT

Appendix A-2: Inundation Map Documentation

FLOOD INUNDATION AREA

The dam-failure flood inundation map and summary for Sheriff Dam was prepared by W. W. Wheeler and Associates, Inc. (Wheeler) in November 2016. The purpose of this document is to summarize the methods and assumptions used to develop the inundation mapping for the Sheriff Dam Emergency Action Plan (EAP). The flood inundation base mapping consists of the latest aerial imagery available at http://services.arcgisonline.com dated September 2015.

Sheriff Dam is a high hazard dam constructed in 1953 in Rio Blanco County, Colorado. This dam failure and inundation analysis was performed by Wheeler based on information that was provided by The Town of Oak Creek, the Colorado Division of Water Resources (DWR), and information that was available online. Two site visits were performed to inspect Sheriff Dam and take measurements of the downstream bridge crossings to include in the inundation mapping.

The inundation mapping for the failure of Sheriff Dam was developed from a computer simulation of the dam failure and channel routing of the flood wave's travel through the stream channel downstream of the dam. The first step of the simulation was to prepare a reservoir routing model of the sunny day failure of Sheriff Dam. This reservoir routing model was simulated with the U.S. Army Corp of Engineers Hydrologic Modeling System (HEC-HMS) Version 4.1 (USACE, 2015). Failure of the Sheriff Dam was modeled as a sunny day failure with the water surface at the normal high water line, which is 7 feet below the dam crest. The dam was assumed to fail with no initial base flow in the downstream channel and no incoming flow into the reservoir. The reservoir capacity curve was provided by Brian Romig and summarized in Table A.2-1 (Romig, 2016).

The second step of the analysis was to simulate the channel routing downstream of Sheriff Dam in Trout Creek using the breach hydrograph obtained from the HEC-HMS model. First, the flood wave flows northeast from Sheriff Dam in Trout Creek through a narrow mountain canyon for approximately 7 miles then Trout Creek transitions into a wider valley for approximately 15 miles before becoming even wider with multiple irrigation fields adjacent to the creek. Approximately 34 miles downstream of the dam, Trout Creek flows into the Yampa River. The channel routing of the breach hydrograph was simulated using the unsteady flow option in the USACE HEC-RAS River Analysis System computer model (USACE, 2010).

The cross-sections used in the HEC-RAS simulation model were extracted from a digital elevation model (DEM) from the 1/3 arc second (~10m) National Elevation Dataset (NED) developed in 2000 by digitizing topographic maps originally developed in 1965 (USGS, 2000). All of the cross-sections were extracted from the DEM surface using the HEC-GeoRAS ArcGIS extension developed by the USACE (USACE, 2011). A roughness coefficient of 0.04 for meandering clean bottom channel with brush on sides and 0.060 for the left and right overbank areas with a combination of brush, residential, and crop lands was selected for the model

(Chow, 1959). The channel banks were estimated based on the aerial imagery and available topographic data.

Bridges and culverts located along Trout Creek were initially modeled in CulvertMaster and FlowMaster to estimate the existing capacity of the bridge and/or culvert. If the estimated bridge/culvert capacity was equal to or greater than approximately 10-percent of the dam failure peak discharge the structures were modeled in the HEC-RAS model. Bridges and culverts with capacities of less than 10-percent of the dam failure peak discharge were not included in the hydraulic model and conservatively assumed to wash-out as a result of the dam failure. The bridges modeled in HEC-RAS include County Road 33, two Railroad Crossings, and two County Road 179 crossings. However, callouts were added to the inundation map at road crossings to identify the peak discharge, arrival time, and approximate flood depth from the base of the channel.

The sunny day failure peak breach discharge from Sheriff Dam, with the initial water surface at the normal high water line, is approximately 47,200 cfs. The inundation mapping was terminated approximately 34 miles downstream of Sheriff Dam, at the confluence of Trout Creek and the Yampa River. The inundation mapping was terminated at the Yampa River because the peak dam failure inundation discharge entering the Yampa River (8,900 cfs) was less than the FEMA calculated 100-year peak discharge in the Yampa River approximately 9 miles upstream of the confluence with Trout Creek (14,520 cfs) (FEMA, 2005).

TABLE A-2.1 – SHERIFF DAM RESERVOIR CAPACITY CURVE

Elevation (NGVD88-ft)	Volume (ac-ft)
9673	0
9675	1.07
9677	2.14
9679	3.2
9681	4.27
9683	5.34
9685	12.44
9687	28.49
9689	52.61
9691	80.72
9693	112.1
9695	146.8
9697	184.2
9699	226.4
9701	271.1
9703	319
9705	370.1
9707	424.3
9709	481.6
9711	542.4
9713	606.9
9715	675.4
9717	747.8
9719	824.1
9721	903.7
9723	986.5

BREACH PARAMETERS

Key dam breach parameters used in the dam failure simulation of Sheriff Dam are shown in Table A-2.2.

TABLE A-2.2 - BREACH PARAMETER INFORMATION FOR SHERIFF DAM (1)

Determined Parameters	Notation (units)	Sunny Day Dam Failure at Spillway
Dam Crest Elevation	Crest (ft)	9730
Elevation of Water at Breach Initiation (Initial Water Surface Elevation)	WSEL (ft)	9723
Reservoir Surface Area at Breach Initiation	SA (acres)	37.5
Volume of water at Breach Initiation	V_w (acre-ft)	987
Breach Initiation Water Height	H_W (ft)	50
Dam Height	H (ft)	57
Breach Bottom Elevation	E_B (ft)	9673
Average Breach Width	W (ft)	88
Breach Bottom Width	W_B (ft)	60
Breach Development Time	T_F (hours)	0.36
Breach Side Slopes (ZH:1V)	Z (ft/ft)	0.5

(1) Breach parameters were obtained from the DEM, 1965 drawings, storage capacity curve provided by Brian Romig, Emergency Action Plan (EAP) and the National Inventory of Dams (NID).

The dam dimensions, storage capacity, embankment slopes, and breach bottom elevation was obtained from an assortment of information: DEM (USGS, 2000), 1965 drawings (Sheriff, 1965), storage capacity curve (Romig, 2016), 2016 EAP and the National Inventory of Dams (NID) and used in the development of breach parameters. The bottom of the breach elevation was selected to be the downstream toe of the dam.

Based on the Guidelines for Dam Breach Analyses from the Colorado Division of Water Resources (DWR, 2010), the appropriate empirical method for developing the breach parameters was developed by Froehlich (Froehlich, 2008). The MacDonald and Langridge-Monopolis with Washington State failure time breach parameters were also developed by Wheeler; however, this method provided a less conservative breach discharge for the inundation mapping. The Colorado DWR, Dam Safety Branch (CO DWR. 2011) spreadsheet developed according to the Froehlich (2008) empirical breach parameter methodology was used to develop the breach parameters for the breach development time and breach size. When

modeling the breach in HEC-HMS, the “overtopping breach” method was applied to use the Froehlich breach parameters that apply to the weir equation. Froehlich does not provide breach parameter guidance for the parameters required for the “piping breach” method calculated using the orifice equation.

RESULTS OF DAM FAILURE INUNDATION MAPPING

The results of the dam failure inundation analyses are illustrated on the flood inundation mapping in the EAP and summarized in Table A-2.3. The inundation boundaries were developed using the HEC-GeoRAS extension to locate the intersection of the topographic surface and the maximum water surface elevation. The dam failure inundation information provided in this EAP should be used as a guideline of conservatively estimated dam failure flooding conditions. Actual conditions during an emergency at Sheriff Dam may vary significantly from this information based on the actual conditions at the time of the emergency.

Flood wave travel times shown on the flood inundation maps and in Table A-2.3 are based on the assumption that the Sheriff Dam failure begins at time 0:00 (hours: minutes). The flood wave arrival time shown in the inundation summary on the following page represents the approximate time after the dam failure when the water surface elevation at each cross-section starts to rise due to the dam-failure flood wave. The peak flood stage time shown represents the estimated time after a failure of Sheriff Dam that the maximum expected flood depths are reached at each downstream cross-section.

TABLE A-2.3 – SUMMARY OF DOWNSTREAM ROUTING:
SUNNY-DAY-BREACH OF SHERIFF DAM EAP

Cross Section	HEC-RAS Station	Distance Downstream of dam	Peak Flow	Peak Water Surface Elevation	Peak River Stage	Maximum Channel Velocity	Flood Wave Arrival Time	Time to Peak Flood Stage
		(Miles)	(Cfs)	(Feet)	(Feet)	(Feet/sec)	(Hrs:min)	(Hrs:min)
Downstream of Sheriff Dam	180974.8	0	47,193	9,723	39.8	37	00:00	00:30
Forest Service Road 959 Crossing	176864.4	0.8	46,863	9,441	13.6	28	00:10	00:31
County Road 8 Crossing	168636.5	2.3	46,415	9,137	12.2	18	00:16	00:32
Cross-section A	160200.4	3.9	46,179	8,702	14.6	31	00:22	00:33
County Road 29 Crossing A	143586.7	7.1	45,517	8,095	10.4	23	00:32	00:36
Residential House A	142648.2	7.3	45,466	8,058	9.0	22	00:33	00:37
County Road 29 Crossing B	141069.4	7.6	45,120	8,009	4.7	7	00:34	00:38
Cross-section B	126766.1	10.3	41,250	7,649	9.7	22	00:48	00:50
Residential House B	113814.5	12.7	37,933	7,388	11.7	19	00:56	01:00
Hidden Mesa Drive Crossing	110901	13.3	36,871	7,332	14.1	24	00:58	01:02
County Road 27 Crossing	106278.2	14.1	36,093	7,237	10.7	23	01:02	01:06
Cross-section C	97928.95	15.7	31,697	7,113	10.8	17	01:10	01:16
Residential House C	84466.56	18.3	22,987	6,964	20.7	3	01:24	01:34
Residential House D	81777.25	18.8	22,857	6,930	11.3	11	01:26	01:38
Residential House E	77967.95	19.5	22,160	6,891	9.0	12	01:30	01:42
County Road 179 Crossing A	64237.44	22.1	21,475	6,752	11.3	14	01:48	02:00
County Road 33 Crossing	55733.2	23.7	19,567	6,689	14.1	3	02:02	02:16
Trout Mountain Road Crossing	53646.7	24.1	19,532	6,654	6.2	12	02:06	02:18
County Road 179 Crossing B	43823.94	26.0	16,873	6,597	14.2	7	02:22	02:42
Residential House F	27554.25	29.1	10,304	6,558	17.5	2	02:46	03:24
Railroad Crossing A / County Road 179 Crossing C	22658.49	30.0	9,451	6,556	15.4	5	02:58	03:48

Cross Section	HEC-RAS Station	Distance Downstream of dam	Peak Flow	Peak Water Surface Elevation	Peak River Stage	Maximum Channel Velocity	Flood Wave Arrival Time	Time to Peak Flood Stage
		(Miles)	(Cfs)	(Feet)	(Feet)	(Feet/sec)	(Hrs:min)	(Hrs:min)
Railroad Crossing B	21504.07	30.2	9,188	6,556	13.2	2	03:04	04:00
Railroad Crossing C	16445.2	31.2	9,182	6,533	10.4	5	03:08	04:12
Railroad Crossing D	13442.21	31.7	9,180	6,525	10.8	9	03:10	04:22
Railroad Crossing E	8310.912	32.7	9,160	6,506	11.1	9	03:24	04:44
Pedestrian Bridge Crossing	6328.505	33.1	9,154	6,490	6.3	6	03:28	04:46
County Road 179 Crossing D	3898.884	33.5	8,886	6,482	12.7	2	03:38	05:06

REFERENCES

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4. Colorado Division of Water Resources, Dam Safety Branch (CO DWR, 2011), *Estimation of Dam Breach Parameters Using the Froehlich 2008 Method,* Froehlichv2.0.xlsm, Release date 9 February 2011.
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6. Sheriff Design Drawings, (Sheriff, 1965), *Sheriff Reservoir Dam*, June 1964.
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9. Emergency Action Plan (EAP, 2016), *Sheriff Dam*, July 2016.
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12. United States Army Corps of Engineers, (USACE, 2011), *HEC-GeoRAS, An extension for the support of HEC-RAS using ArcGIS,* Version 4.3.93*,* Davis, CA, February 2011.
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14. United States Army Corps of Engineers (USACE, 2015), HEC-HMS Version 4.1, Davis, CA, July 2015.
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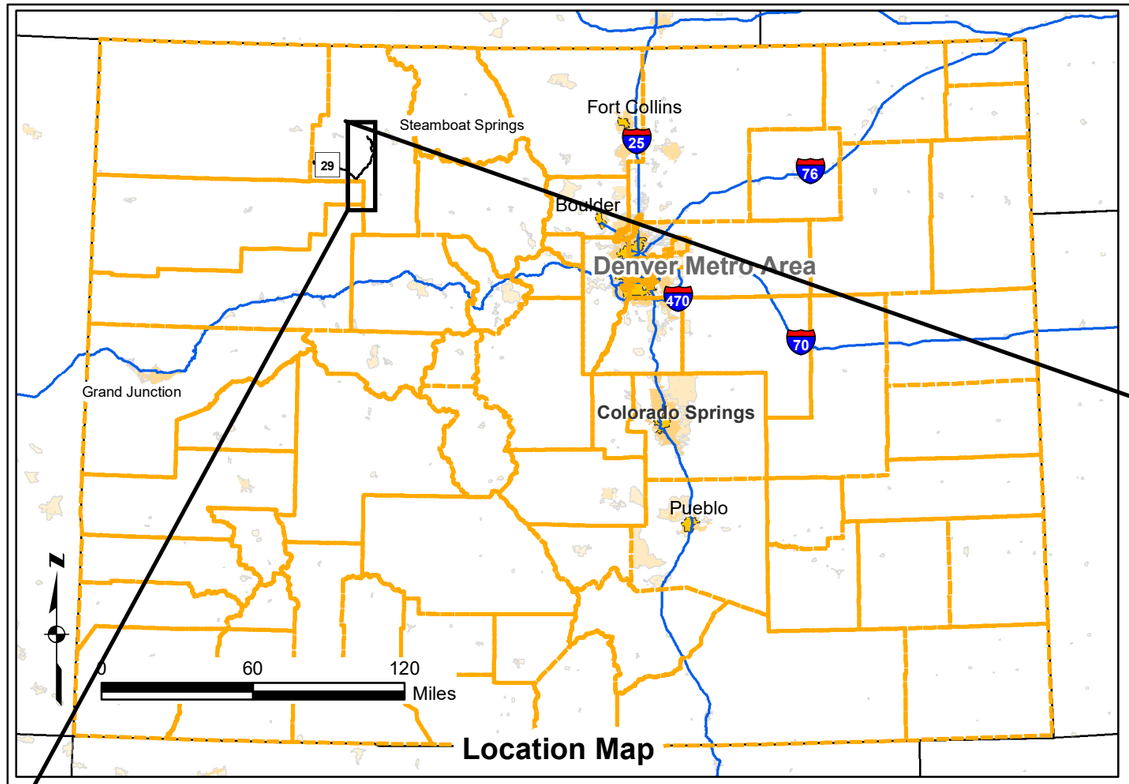
16. Viessman, Warren and Gary L. Lewis, (Viessman and Lewis, 2003), *Introduction to Hydrology, 5th Ed.*, Pearson Education Inc., Upper Saddle River, NJ, p 268, 2003.
17. Von Thun, Lawrence and David R. Gillette, (Von Thun and Gillette, 1990), *Guidance on Breach Parameters,* March 13, 1990.

SHERIFF DAM
DAM ID 570129
Emergency Action Plan
Dam Failure Flood Inundation Map Index

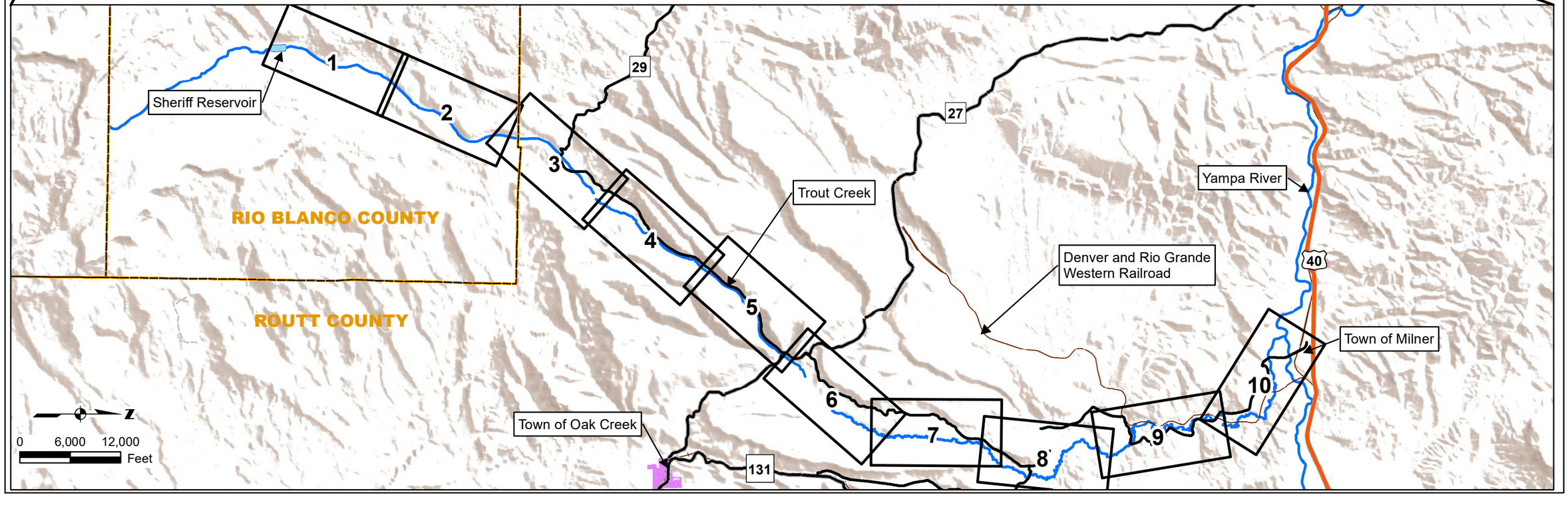
Prepared for:
The Town of Oak Creek

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

Job No. 1865.01
JANUARY 2017



Location Map



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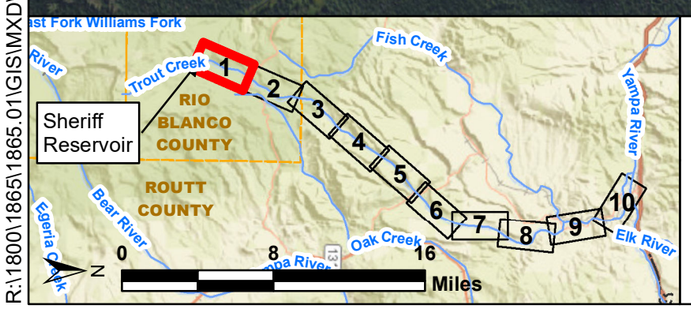
Downstream of Sheriff Dam
0 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 47,193
Maximum Water Surface Elevation (ft) = 9723
Maximum Stage (ft) = 39.8
Maximum Channel Velocity (ft/s) = 37
Flood Wave Arrival Time (hr:min) = 00:00
Time to Peak Flood Stage (hr:min) = 00:30

County Road 8 Crossing
2.3 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 46,415
Maximum Water Surface Elevation (ft) = 9137
Maximum Stage (ft) = 12.2
Maximum Channel Velocity (ft/s) = 18
Flood Wave Arrival Time (hr:min) = 00:16
Time to Peak Flood Stage (hr:min) = 00:32

Forest Service 959 Crossing
0.8 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 46,863
Maximum Water Surface Elevation (ft) = 9441
Maximum Stage (ft) = 13.6
Maximum Channel Velocity (ft/s) = 28
Flood Wave Arrival Time (hr:min) = 00:10
Time to Peak Flood Stage (hr:min) = 00:31

959
Trout Creek
County Road 8
8
Forest Service Road 959
Sheriff Reservoir
Map Sheet 1
Map Sheet 2

Notes: The base map is aerial imagery from September 2015 and the index map is part of a world street map by ESRI dated October 2016. The flood inundation information shown is based on a computer simulated sunny day failure of Sheriff Dam. The flood inundation information shown should be used as a guideline only. Actual flooding conditions will vary depending on actual conditions during a flood emergency. Time t=0 is the time that the breach begins to develop.



NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000 Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 1

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Cross-Section A
3.9 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 46,179
Maximum Water Surface Elevation (ft) = 8702
Maximum Stage (ft) = 14.6
Maximum Channel Velocity (ft/s) = 31
Flood Wave Arrival Time (hr:min) = 00:22
Time to Peak Flood Stage (hr:min) = 00:33

Trout Creek
8
Map Sheet 1
Map Sheet 2
959
County Road 8
Trout Creek
Map Sheet 2
Map Sheet 3

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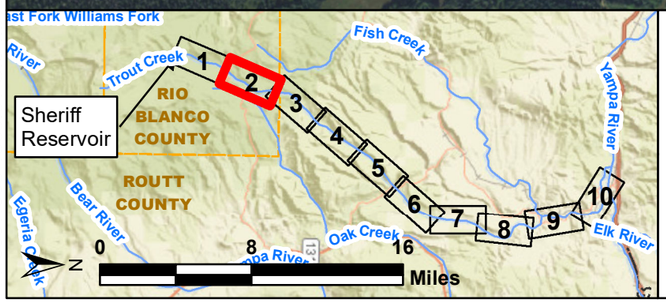

NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000
Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 2

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County Road 29 Crossing A
7.1 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 45,517
Maximum Water Surface Elevation (ft) = 8095
Maximum Stage (ft) = 10.4
Maximum Channel Velocity (ft/s) = 23
Flood Wave Arrival Time (hr:min) = 00:32
Time to Peak Flood Stage (hr:min) = 00:36

Residential House A
7.3 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 45,466
Maximum Water Surface Elevation (ft) = 8058
Maximum Stage (ft) = 9.0
Maximum Channel Velocity (ft/s) = 22
Flood Wave Arrival Time (hr:min) = 00:33
Time to Peak Flood Stage (hr:min) = 00:37

County Road 29 Crossing B
7.6 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 45,120
Maximum Water Surface Elevation (ft) = 8009
Maximum Stage (ft) = 4.7
Maximum Channel Velocity (ft/s) = 7
Flood Wave Arrival Time (hr:min) = 00:34
Time to Peak Flood Stage (hr:min) = 00:38

29
29
132A
Tilly Lane
Trout Creek
Trout Creek
Map Sheet2
Map Sheet3
Map Sheet3
Map Sheet4

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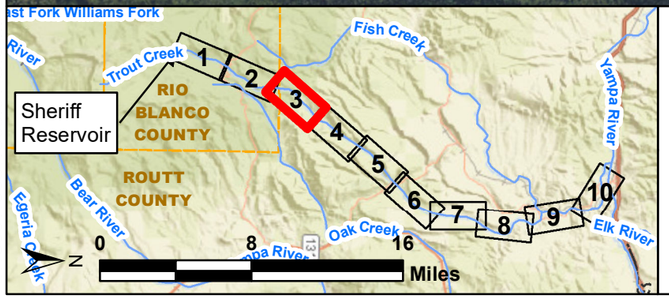

NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000
Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 3

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29

Trout Creek

Map Sheet 3

Map Sheet 4

Map Sheet 4

Map Sheet 5

Cross-section B
10.3 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 41,250
Maximum Water Surface Elevation (ft) = 7649
Maximum Stage (ft) = 9.7
Maximum Channel Velocity (ft/s) = 22
Flood Wave Arrival Time (hr:min) = 00:48
Time to Peak Flood Stage (hr:min) = 00:50

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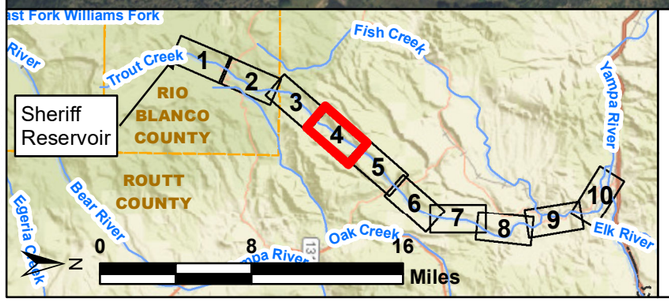

NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000 Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 4

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Hidden Mesa Drive Crossing
13.3 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 36,871
Maximum Water Surface Elevation (ft) = 7332
Maximum Stage (ft) = 14.1
Maximum Channel Velocity (ft/s) = 24
Flood Wave Arrival Time (hr:min) = 00:58
Time to Peak Flood Stage (hr:min) = 01:02

County Road 27 Crossing
14.1 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 36,093
Maximum Water Surface Elevation (ft) = 7237
Maximum Stage (ft) = 10.7
Maximum Channel Velocity (ft/s) = 23
Flood Wave Arrival Time (hr:min) = 01:02
Time to Peak Flood Stage (hr:min) = 01:06

Residential House B
12.7 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 37,933
Maximum Water Surface Elevation (ft) = 7388
Maximum Stage (ft) = 11.7
Maximum Channel Velocity (ft/s) = 19
Flood Wave Arrival Time (hr:min) = 00:56
Time to Peak Flood Stage (hr:min) = 01:00

Rocky Road
Trout Creek
29
Middle Creek Road
27
Hidden Mesa Drive
Map Sheet 4
Map Sheet 5
Map Sheet 6

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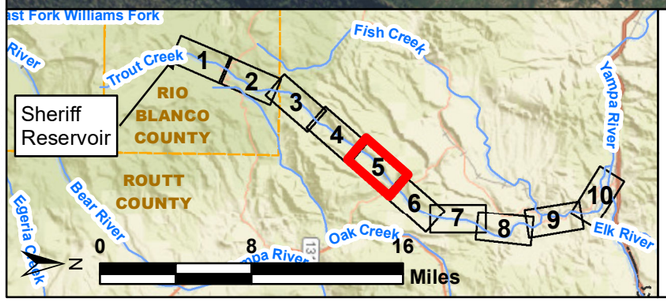

NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000 Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 5

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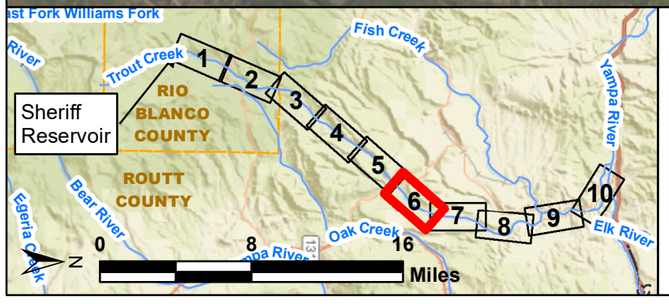
Cross-section C
15.7 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 31,697
Maximum Water Surface Elevation (ft) = 7113
Maximum Stage (ft) = 10.8
Maximum Channel Velocity (ft/s) = 17
Flood Wave Arrival Time (hr:min) = 01:10
Time to Peak Flood Stage (hr:min) = 01:16

27
29
27
29
Trout Creek
Map Sheet 5
Map Sheet 6
Map Sheet 7

Notes: The base map is aerial imagery from September 2015 and the index map is part of a world street map by ESRI dated October 2016. The flood inundation information shown is based on a computer simulated sunny day failure of Sheriff Dam. The flood inundation information shown should be used as a guideline only. Actual flooding conditions will vary depending on actual conditions during a flood emergency. Time t=0 is the time that the breach begins to develop.



NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000
Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 6

R:\1800\1865\1865.01\GIS\MXD\Sherrif_MAPSHEETS.mxd

Residential House D
18.8 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 22,857
Maximum Water Surface Elevation (ft) = 6930
Maximum Stage (ft) = 11.3
Maximum Channel Velocity (ft/s) = 11
Flood Wave Arrival Time (hr:min) = 01:26
Time to Peak Flood Stage (hr:min) = 01:38

29

Tobianco Trail

Trout Creek

Map Sheet 6

Map Sheet 7

Residential House C
18.3 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 22,987
Maximum Water Surface Elevation (ft) = 6964
Maximum Stage (ft) = 20.7
Maximum Channel Velocity (ft/s) = 3
Flood Wave Arrival Time (hr:min) = 01:24
Time to Peak Flood Stage (hr:min) = 01:34

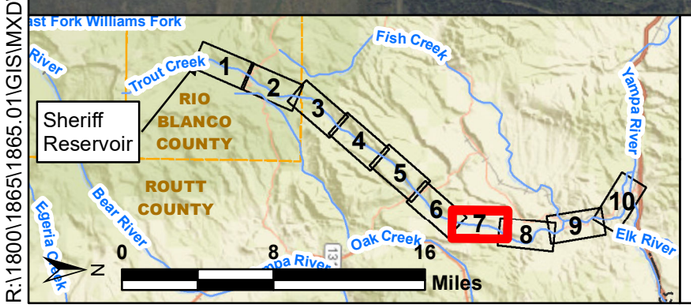
Residential House E
19.5 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 22,160
Maximum Water Surface Elevation (ft) = 6891
Maximum Stage (ft) = 9.0
Maximum Channel Velocity (ft/s) = 12
Flood Wave Arrival Time (hr:min) = 01:30
Time to Peak Flood Stage (hr:min) = 01:42

29

Map Sheet 7

Map Sheet 8

Notes: The base map is aerial imagery from September 2015 and the index map is part of a world street map by ESRI dated October 2016. The flood inundation information shown is based on a computer simulated sunny day failure of Sheriff Dam. The flood inundation information shown should be used as a guideline only. Actual flooding conditions will vary depending on actual conditions during a flood emergency. Time t=0 is the time that the breach begins to develop.



NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000
Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 7

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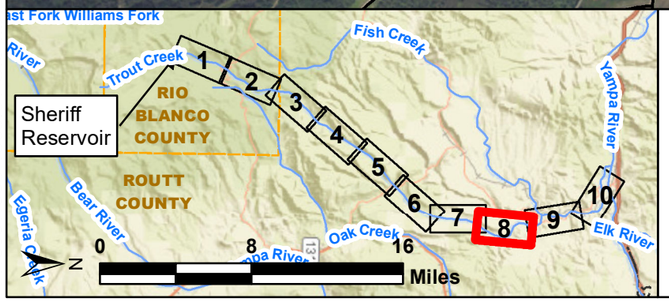
Trout Mountain Road Crossing
24.1 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 19,532
Maximum Water Surface Elevation (ft) = 6654
Maximum Stage (ft) = 6.2
Maximum Channel Velocity (ft/s) = 12
Flood Wave Arrival Time (hr:min) = 02:06
Time to Peak Flood Stage (hr:min) = 02:18

County Road 179 Crossing A
22.1 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 21,475
Maximum Water Surface Elevation (ft) = 6752
Maximum Stage (ft) = 11.3
Maximum Channel Velocity (ft/s) = 14
Flood Wave Arrival Time (hr:min) = 01:48
Time to Peak Flood Stage (hr:min) = 02:00

County Road 33 Crossing
23.7 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 19,567
Maximum Water Surface Elevation (ft) = 6689
Maximum Stage (ft) = 14.1
Maximum Channel Velocity (ft/s) = 3
Flood Wave Arrival Time (hr:min) = 02:02
Time to Peak Flood Stage (hr:min) = 02:16

33
179
33
Trout Mountain Road
Trout Creek
Vista Ridge Drive
33
29
Map Sheet 7
Map Sheet 8
Map Sheet 8
Map Sheet 9
179
33
Trout Creek
Creek Ranch Road
Rainbow Ridge

Notes: The base map is aerial imagery from September 2015 and the index map is part of a world street map by ESRI dated October 2016. The flood inundation information shown is based on a computer simulated sunny day failure of Sheriff Dam. The flood inundation information shown should be used as a guideline only. Actual flooding conditions will vary depending on actual conditions during a flood emergency. Time t=0 is the time that the breach begins to develop.



NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000 Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 8

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Residential House F
29.1 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 10,304
Maximum Water Surface Elevation (ft) = 6558
Maximum Stage (ft) = 17.5
Maximum Channel Velocity (ft/s) = 2
Flood Wave Arrival Time (hr:min) = 02:46
Time to Peak Flood Stage (hr:min) = 03:24

Railroad Crossing A /
County Road 179 Crossing C
30.0 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 9,451
Maximum Water Surface Elevation (ft) = 6556
Maximum Stage (ft) = 15.4
Maximum Channel Velocity (ft/s) = 5
Flood Wave Arrival Time (hr:min) = 02:58
Time to Peak Flood Stage (hr:min) = 03:48

County Road 179 Crossing B
26.0 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 16,873
Maximum Water Surface Elevation (ft) = 6597
Maximum Stage (ft) = 14.2
Maximum Channel Velocity (ft/s) = 7
Flood Wave Arrival Time (hr:min) = 02:22
Time to Peak Flood Stage (hr:min) = 02:42

179
Trout Creek
Denver and Rio Grande Western Railroad
33B
Map Sheet 8
Map Sheet 9
Map Sheet 10

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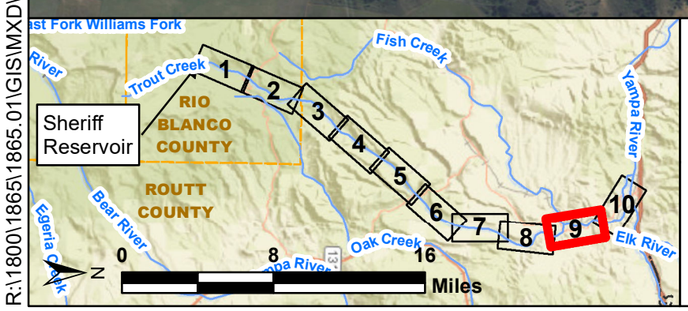

NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000
Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 9

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Railroad Crossing B
30.2 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 9,188
Maximum Water Surface Elevation (ft) = 6556
Maximum Stage (ft) = 13.2
Maximum Channel Velocity (ft/s) = 2
Flood Wave Arrival Time (hr:min) = 03:04
Time to Peak Flood Stage (hr:min) = 04:00

Railroad Crossing C
31.2 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 9,182
Maximum Water Surface Elevation (ft) = 6533
Maximum Stage (ft) = 10.4
Maximum Channel Velocity (ft/s) = 5
Flood Wave Arrival Time (hr:min) = 03:08
Time to Peak Flood Stage (hr:min) = 04:12

County Road 179 Crossing D
33.5 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 8,886
Maximum Water Surface Elevation (ft) = 6482
Maximum Stage (ft) = 12.7
Maximum Channel Velocity (ft/s) = 2
Flood Wave Arrival Time (hr:min) = 03:38
Time to Peak Flood Stage (hr:min) = 05:06

Railroad Crossing D
31.7 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 9,180
Maximum Water Surface Elevation (ft) = 6525
Maximum Stage (ft) = 10.8
Maximum Channel Velocity (ft/s) = 9
Flood Wave Arrival Time (hr:min) = 03:10
Time to Peak Flood Stage (hr:min) = 04:22

Railroad Crossing E
32.7 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 9,160
Maximum Water Surface Elevation (ft) = 6506
Maximum Stage (ft) = 11.1
Maximum Channel Velocity (ft/s) = 9
Flood Wave Arrival Time (hr:min) = 03:24
Time to Peak Flood Stage (hr:min) = 04:44

Pedestrian Bridge Crossing
33.1 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 9,154
Maximum Water Surface Elevation (ft) = 6490
Maximum Stage (ft) = 6.3
Maximum Channel Velocity (ft/s) = 6
Flood Wave Arrival Time (hr:min) = 03:28
Time to Peak Flood Stage (hr:min) = 04:46

Downstream Inundation Limits
Maximum Peak Discharge
Entering Yampa River = 8,900 cfs

FEMA 100-year Peak Discharge
in Yampa River = 14,500 cfs

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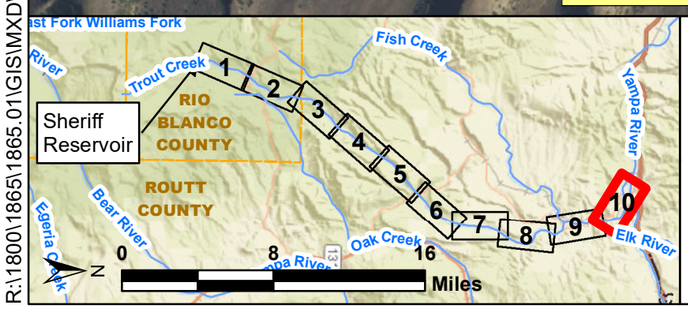

NOTES:

Cross-Sections

Inundation Limits - Sunny Day failure of Sheriff Reservoir

N

0 500 1,000 2,000 Feet

JANUARY 2017

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

SHERIFF DAM - DAM ID 570129
Emergency Action Plan
Dam Failure Inundation Map

Job No. 1865.01 | MAP SHEET 10

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TOWN OF OAK CREEK

P.O. Box 128 • Oak Creek, Colorado 80467 • (970) 736-2422

March 20, 2017

Jonathan Hernandez
Colorado Water Board Conservation
1313 Sherman Street, Room 718
Denver, CO 80203

via e-mail jonathan.hernandez@state.co.us

RE: Sheriff Dam – Dam Inundation Mapping
Purchase Order Number POGG1 2017-394

Dear Mr. Hernandez:

The Town of Oak Creek (Town) has completed the Sheriff Dam Inundation Mapping Project, and by this letter is submitting for reimbursement of $9,178.40 (93%) of the associated costs pursuant to the above referenced purchase order.

Also included with this letter is:

1. A copy of the engineer's invoice showing total and final project costs in the amount of $9,869.25;
2. A copy of the Town's check in payment of the total and final project costs in the amount of $9,869.25;
3. A copy of letter of approval of the project from Dana Miller, Dam Safety Engineer, Dam Safety Branch, Colorado Division of Water Resources;
4. A copy of the stamped and signed Final Report from W.W. Wheeler; and
5. Copies of the inundation maps.

This letter as well as the items noted above are being provided electronically to your email as requested.

Let us know if you need any additional information.

Sincerely,

Mary Alice Page-Allen
Town Administrator/Clerk

xc: file

VENDOR: 2685 W. W. WHEELER & ASSOCIATES, INC. 12/15/2016 Check No: 25195

INVOICE #		INV DATE	DESCRIPTION	INV AMOUNT
33363	1	12/08/2016	Sheriff Dam Inundation Mapping	9,869.25

TOTAL AMOUNT 9,869.25

TOWN OF OAK CREEK
PO Box 128
Oak Creek, CO 80467
970-736-2422

Bank of the San Juans
Division of Glacier Bank
PO Box 69
Oak Creek, CO 80467
82-656/1021

25195

DATE 12/15/2016

25195

AMOUNT $ **9,869.25**

PAY TO THE ORDER OF:

Nine Thousand Eight Hundred Sixty-Nine and 25/100 Dollars

W. W. WHEELER & ASSOCIATES, INC.
3700 S. INCA ST
ENGLEWOOD CO 80110-3405

AUTHORIZED SIGNATURE

Details on Back. Security Features Included

⑈025195⑈ ⑆102106569⑆ 120100060298⑈

TOWN OF OAK CREEK

25195

VENDOR: 2685 W. W. WHEELER & ASSOCIATES, INC. 12/15/2016 Check No: 25195

INVOICE #		INV DATE	DESCRIPTION	INV AMOUNT	GL Number
33363	1	12/08/2016	Sheriff Dam Inundation Mapping	9,869.25	30-12-4900

TOTAL AMOUNT 9,869.25

W. W. WHEELER
& ASSOCIATES, INC.
Water Resources Engineers
3700 S. Inca St. | Englewood, CO 80110-3405
303-761-4130 | Fax 303-761-2802

The Town of Oak Creek
P.O. Box 128
Oak Creek, CO 80467

December 8, 2016
Project No: 1865.01.00
Invoice No: 33363

Project 1865.01.00 Sheriff Dam Inundation Mapping

Attention: Mary Alice Page-Allen,
Town Administrator/Clerk

Professional Services from November 1, 2016 to November 30, 2016

Professional Personnel

	Hours	Rate	Amount	
Senior Project Engineer				
Jamieson, Stephen	14.25	150.00	2,137.50	
Staff Engineer				
Hannes, Danielle	1.00	117.00	117.00	
Lewis, Todd	3.25	117.00	380.25	
Associate Engineer				
Mugele, Christine	68.25	106.00	7,234.50	
Totals	86.75		9,869.25	
Total Labor				**9,869.25**
		Total this Invoice		**$9,869.25**

Please note invoice number when submitting remittance. Thank you.

COLORADO
Division of Water Resources
Department of Natural Resources

Dam Safety Branch

March 7, 2017

Mr. Jonathan Hernandez, P.E.
Colorado Water Conservation Board
1313 Sherman St., Rm. 718
Denver, CO 80203

When replying, please refer to:
SHERIFF DAM, DAMID 570129
Water Division 6, Water District 57

SUBJECT: Acceptance of Inundation Mapping

Dear Jonathan,

Inundation mapping for inclusion with the Emergency Action Plan for Sheriff Dam has been completed by W. W. Wheeler, Inc. for the Town of Oak Creek. The Dam Safety Branch has reviewed the mapping and supporting documentation and finds them acceptable. We have also received all required electronic files, and consider the project complete.

Please let me know if you require anything further from me. Thanks to you and the Colorado Water Conservation Board for your continued support towards improving the safety of dams in Colorado!

Sincerely,

Dana Miller, P.E.
Dam Safety Engineer

ec: Mary Alice Page-Allen, maryalice@townofoakcreek.com
Steve Jamieson, steve.jamieson@wwwheeler.com

STATE OF COLORADO
Department of Natural Resources

ORDER
Number: POGG1 PDAA 201700000394
Date: 09/15/16
Description:
PDAA6000 Sev Tax Grant Inundation map sheriff dam
Effective Date: 09/15/16 Expiration Date: 06/30/17

BUYER
Buyer:
Email:

VENDOR
TOWN OF OAK CREEK
PO BOX 128
OAK CREEK, CO 80467-0128

Contact: .
Phone: .

**** IMPORTANT ****
The order number and line number must appear on all invoices, packing slips, cartons and correspondence

BILL TO
COLORADO WATER BOARD CONSERVATION
1313 SHERMAN STREET, ROOM 718
DENVER, CO 80203

SHIP TO
COLORADO WATER BOARD CONSERVATION
1313 SHERMAN STREET, ROOM 718
DENVER, CO 80203

SHIPPING INSTRUCTIONS
Delivery/Install Date:
F.O.B:
VENDOR INSTRUCTIONS:

Line Item	Commodity/Item Code	UOM	QTY	Unit Cost	Total Cost	MSDS Req.
1	G1000		0	0.00	$9,200.00	☐

Description: PDAA6000 Sev Tax Grant Inundation map sheriff dam

Service From: 09/15/16 Service To: 06/30/17

TERMS AND CONDITIONS
https://www.colorado.gov/osc/purchase-order-terms-conditions

DOCUMENT TOTAL = $9,200.00

September 1, 2016

Project: Inundation Mapping for Sherriff Dam

Vendor: Town of Oak Creek
Ms. Mary Alice Page-Allen, Town Administrator
P.O. Box 128
Oak Creek, CO 80467
Phone / email: 970-736-2422 / maryalice@townofoakcreek.com

Consultant: W.W. Wheeler & Associates, Inc.
Ms. Danielle Hannes, P.E.
3700 Inca Street
Englewood, CO 80110-3405
Phone / email: (303) 761-4130 / Danielle.hannes@wwwwheeler.com

CWCB funding source: Severance Tax Trust Fund Operational Account

SCOPE OF WORK

W.W. Wheeler, Inc. (Consultant), at the direction of the Town of Oak Creek (Vendor), will perform a dam breach modeling study and associated flood inundation mapping for the above structure which they are the owner of. Sherriff Dam is a High Hazard dam located in Routt County and is tributary to Trout Creek within the Yampa River Basin. A breach analysis and inundation mapping will be performed from the dam along Trout Creek to a point where impacts to public safety are negligible. This is expected to be occur the confluence of Trout Creek and the Yampa River which is located approximately 40 miles downstream.

Consultant or Vendor will submit the final report and mapping to the Colorado Division of Water Resources, Dam Safety Branch, for approval. Grant funds will not be disbursed until the project has been approved by the Dam Safety Branch.

PROPOSED METHODOLOGY

The Consultant shall perform a clear dam breach analyses in accordance with the State of Colorado Rules and Regulations for Dam Safety and Dam Construction (1/1/2007), and the Dam Safety Guidelines for Dam Breach Analysis (2/10/2010). Correspondence shall be with Dana Miller, P.E., of the Colorado Division of Water Resources, Dam Safety Branch, to present preliminary dam breach parameters, water surface profile modeling, and inundation mapping and to determine if field measurements are necessary for critical bridges.

Inundation mapping for High Hazard dams shall show the calculated extents of the dam breach flood wave. The mapping will also include cross sections at critical locations showing lateral and vertical flood extents, flood wave velocity, and flood wave arrival time. Inundation mapping shall be extended downstream to a location where no potential for loss of life and/or no significant property damage exist.

Inundation mapping for Significant Hazard dams shall show the route of the dam breach flood wave, the estimated time of arrival of the flood wave at critical sections, and the estimated lateral extent of inundation. The inundation mapping shall be extended downstream to a location where no significant

property damage exists. The inundation mapping requirements for Significant Hazard dams may be modified for good cause, with the approval of the State Engineer.

DELIVERABLES

The Vendor shall provide the CWCB electronic copies of the following: Final Report for the inundation mapping analysis stamped by a licensed Colorado professional engineer, and inundation maps. Additionally the Vendor shall provide a copy of the project's approval letter from the Colorado Division of Water Resources, Dam Safety Branch.

SCHEDULE

Work may initiate on the date of the State's Purchase Order. Deliverables are due no later than June 15, 2017.

BUDGET

The Consultant will complete the work described for a not-to-exceed budget of $9,902 based on Consultant's current rate schedule and projection of effort. The estimate is summarized. The Consultant shall invoice Vendor on a Time and Materials basis for services performed below:

Task: Breach Routing, Flood Routing	Budget
Sherriff Dam	$9,902

PAYMENT

The State shall pay Vendor up to $9,200 (93 % of Project Cost) for Consultant's project related invoices following receipt of final deliverables. The Vendor is responsible for all expenses in excess of the State's contribution. Any overages or increases in project costs shall be the responsibility of the Vendor.

Estimated Project Cost Sharing:	
Owner Match	$ 702
CWCB Grant	$ 9,200
TOTAL	$ 9,902

CWCB shall issue payment following receipt and processing of Vendor's Request for Payment submittal. The Request for Payment must include: a summary of Consultant's labor effort and direct costs in accordance with the attached estimate, copies of corresponding invoices from Consultant, and identification of any major issues with proposed or implemented corrective actions. The Deliverable, including the Dam Safety Branch's approval letter, must be provided to the CWCB as part of project documentation prior to CWCB issue of payment.

Inundation Mapping for Sherriff Dam

Cost Estimate

W. W. WHEELER
& ASSOCIATES, INC.
Water Resources Engineers
WWW.WWWHEELER.COM

STANDARD RATE SCHEDULE
EFFECTIVE APRIL 1, 2016

CLASSIFICATION	RATE/HOUR
Chief Engineer	$177.00
Senior Water Resource Engineer	$161.00
Senior Project Engineer	$150.00
Senior Engineer	$140.00
Project Engineer	$129.00
Staff Engineer	$117.00
Associate Engineer	$106.00
Assistant Engineer	$96.00
Junior Engineer	$86.00
CADD Drafter	$75.00
Administrative Assistant	$71.00
Technician III	$74.00
Technician II	$61.00
Technician I	$49.00

Project: Sheriff Dam - Engineering Services Dam Inundation Mapping

Date: 28-Jul-16

Wheeler Labor Budget

Task	Labor Cat.	S. Jamieson	D. Hannes	C. Mugele	A. Fasen			Cadd Drafter	Technician II	Admin. Asst.	Labor	Expense	Total
	$/hr	$161.00	$117.00	$106.00	$86.00	$0.00	$0.00	$75.00	$61.00	$71.00			
Sheriff Dam													
Site Visit - Dam and Downstream Reaches			12		12						$2,436	$80	$2,516
Develop Inundation Analyses					34						$2,924	$320	$3,244
Develop Inundation Maps					6						$516	$0	$516
Memorandum			2		4						$578	$0	$578
SEO Comments & QA Check		2	8		16						$2,634	$0	$2,634
Print & Transmit Final SEED Reports					2.0					2.0	$314	$100	$414
		2.0	22.0	0.0	74.0	0.0	0.0	0.0	0.0	2.0			
										Subtotal	$9,402	$500	$9,902

Project: Sheriff Dam - Engineering Services Dam Inundation Mapping

Date: 28-Jul-16

Wheeler Expense Budget

Task	Description	Airfare	Mileage (4WD)	Rental Car	DIA Parking	Meals	Hotel	Color Copies (Maps)	Rental Car Gas	PT Lunches	Fed-ex	Total
	unit cost	$415.000	$0.80	$90.00	$24.00	$20.00	$89.00	$2.00	$50.00	$12.00	$100.00	
Sheriff Dam												
Site Visit - Dam and Downstream Reaches			400.0			4.0						$400
Develop Inundation Analyses												$0
Develop Inundation Maps												$0
Memorandum												$0
SEO Comments & QA Check												$0
Print & Transmit Final SEED Reports								50.0				$100
		0.0	400.0	0.0	0.0	4.0	0.0	50.0	0.0	0.0	0.0	$500

September 1, 2016

Project: Inundation Mapping for Sherriff Dam

Vendor: Town of Oak Creek
Ms. Mary Alice Page-Allen, Town Administrator
P.O. Box 128
Oak Creek, CO 80467
Phone / email: 970-736-2422 / maryalice@townofoakcreek.com

Consultant: W.W. Wheeler & Associates, Inc.
Ms. Danielle Hannes, P.E.
3700 Inca Street
Englewood, CO 80110-3405
Phone / email: (303) 761-4130 / Danielle.hannes@wwwwheeler.com

CWCB funding source: Severance Tax Trust Fund Operational Account

SCOPE OF WORK

W.W. Wheeler, Inc. (Consultant), at the direction of the Town of Oak Creek (Vendor), will perform a dam breach modeling study and associated flood inundation mapping for the above structure which they are the owner of. Sherriff Dam is a High Hazard dam located in Routt County and is tributary to Trout Creek within the Yampa River Basin. A breach analysis and inundation mapping will be performed from the dam along Trout Creek to a point where impacts to public safety are negligible. This is expected to be occur the confluence of Trout Creek and the Yampa River which is located approximately 40 miles downstream.

Consultant or Vendor will submit the final report and mapping to the Colorado Division of Water Resources, Dam Safety Branch, for approval. Grant funds will not be disbursed until the project has been approved by the Dam Safety Branch.

PROPOSED METHODOLOGY

The Consultant shall perform a clear dam breach analyses in accordance with the State of Colorado Rules and Regulations for Dam Safety and Dam Construction (1/1/2007), and the Dam Safety Guidelines for Dam Breach Analysis (2/10/2010). Correspondence shall be with Dana Miller, P.E., of the Colorado Division of Water Resources, Dam Safety Branch, to present preliminary dam breach parameters, water surface profile modeling, and inundation mapping and to determine if field measurements are necessary for critical bridges.

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Task: Breach Routing, Flood Routing	Budget
Sherriff Dam	$9,902

PAYMENT

The State shall pay Vendor up to $9,200 (93 % of Project Cost) for Consultant's project related invoices following receipt of final deliverables. The Vendor is responsible for all expenses in excess of the State's contribution. Any overages or increases in project costs shall be the responsibility of the Vendor.

Estimated Project Cost Sharing:	
Owner Match	$ 702
CWCB Grant	$ 9,200
TOTAL	$ 9,902

CWCB shall issue payment following receipt and processing of Vendor's Request for Payment submittal. The Request for Payment must include: a summary of Consultant's labor effort and direct costs in accordance with the attached estimate, copies of corresponding invoices from Consultant, and identification of any major issues with proposed or implemented corrective actions. The Deliverable, including the Dam Safety Branch's approval letter, must be provided to the CWCB as part of project documentation prior to CWCB issue of payment.

COLORADO
Colorado Water
Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

June 15, 2016

Mr. Bill McCormick, Chief of Dam Safety
Department of Water Resources
810 9th Street, Suite 200
Greeley, CO 80631

Dear Mr. McCormick:

This refers to your application for funding from the Severance Tax Operational Fund (STOF) for the year commencing July 1, 2016. The Colorado Water Conservation Board (CWCB) has approved your application for funding in an amount up to $40,000 to complete your project for the "Dam Safety Inundation Mapping Grant Program." Work should be completed by June 15, 2017. Funds should be disbursed to you by June 30, 2017. Please contact Mr. Jonathan Hernandez at Telephone No. (303) 866-3441, ext. 3234, to assist you through this process.

Should you have any questions or if I can be of any further assistance, please contact me at Telephone No. (303) 866-3441, ext. 3205.

Very truly yours,

S. S. Biondo
Finance Manager

cc: Mr. Jonathan Hernandez, CWCB
CWCB Files

Form **W-9**
State of Colorado
Substitute

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)

Business name/disregarded entity name, if different from above
TOWN OF OAK CREEK

Check appropriate box for federal tax classification:
☐ Individual ☐ Sole Proprietor ☐ Corporation ☐ Partnership ☐ Trust/estate
☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▸
☐ Other (see instructions) ▸ ☑ Government

Exemptions (see instructions):
Exempt payee code (if any)
Exemption from FATCA reporting code (if any)

Address (number, street, and apt. or suite no.)
PO BOX 128

Purchase Order address if different (optional)

City, state, and ZIP code
OAK CREEK CO 80467

List account number(s) here (optional)

Contact name
Mary Alice Page-Allen

Contact Email
maryalice@townofoakcreek.com

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Social security number

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Employer identification number
84-6000702

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below), and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here Signature of U.S. person ▸ [signature] Date ▸ 09/01/2016

Have you ever worked for the State of Colorado? ◯ Yes ◉ No

Have you ever worked for a PERA Employer? ◯ Yes ◉ No

Business Types (check all that apply):

- ☑ CO Location/HQ in CO
- ☐ CO Location/HQ out of CO
- ☐ No CO Location/HQ in US
- ☐ No CO Location/HQ out of US
- ☐ Has Paid Compensation Tax
- ☐ Has Not Paid Compensation Tax
- ☐ African American
- ☐ Asian Pacific American
- ☐ Subcontinent Asian American
- ☐ Hispanic American
- ☐ Native American
- ☐ CDOT Certified Emerging Small Business
- ☐ CDOT Certified Disadvantaged Small Business
- ☐ Women Owned
- ☐ Woman Business Enterprise
- ☐ Veteran Owned
- ☐ Disabled Vet Business Enterprise
- ☐ Disadvantaged Veteran Enterprise
- ☐ Service Disabled Veteran
- ☐ Vietnam Veteran
- ☐ Veteran Business Enterprise
- ☐ Disadvantaged Business Enterprise
- ☐ Small Disadvantaged Business
- ☐ Disabled Owned
- ☐ 8(A) Designation
- ☐ HUBZone Certified
- ☐ Labor Surplus
- ☐ Historical Black Colleges & Universities
- ☐ Small Business
- ☐ Airport Concession Disadvantaged Business

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YY): 08/31/2016

PRODUCER LIC #N/A 1-303-757-5475
CIRSA
3665 Cherry Creek North Drive
Denver, CO 80209

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURERS AFFORDING COVERAGE

INSURED
Town of Oak Creek
PO Box 128
Oak Creek, CO 80467

INSURER A: CIRSA
INSURER B:
INSURER C:
INSURER D:
INSURER E:

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
A	GENERAL LIABILITY	LIAB 01-2016	01/01/16	01/01/17	EACH OCCURRENCE	$ 10,000,000
	X COMMERCIAL GENERAL LIABILITY				FIRE DAMAGE (Any one fire)	$ 10,000,000
	X CLAIMS MADE ☐ OCCUR				MED EXP (Any one person)	$ 0
	X $10m POL E&O Aggregate				PERSONAL & ADV INJURY	$ 10,000,000
					GENERAL AGGREGATE	$
	GEN'L AGGREGATE LIMIT APPLIES PER:				PRODUCTS - COMP/OP AGG	$ 10,000,000
	☐ POLICY ☐ PRO-JECT ☐ LOC					
A	AUTOMOBILE LIABILITY	LIAB 01-2016	01/01/16	01/01/17	COMBINED SINGLE LIMIT (Ea accident)	$ 5,000,000
	X ANY AUTO				BODILY INJURY (Per person)	$
	☐ ALL OWNED AUTOS				BODILY INJURY (Per accident)	$
	☐ SCHEDULED AUTOS				PROPERTY DAMAGE (Per accident)	$
	☐ HIRED AUTOS					
	☐ NON-OWNED AUTOS					
	GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT	$
	☐ ANY AUTO				OTHER THAN AUTO ONLY: EA ACC	$
					AGG	$
	EXCESS LIABILITY				EACH OCCURRENCE	$
	☐ OCCUR ☐ CLAIMS MADE				AGGREGATE	$
						$
	☐ DEDUCTIBLE					$
	☐ RETENTION $					$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				☐ WC STATU-TORY LIMITS ☐ OTH-ER	
					E.L. EACH ACCIDENT	$
					E.L. DISEASE - EA EMPLOYEE	$
					E.L. DISEASE - POLICY LIMIT	$
	OTHER					$
						$
						$

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS

Certificate Holder is Additional Insured on Liability Policies if required by contract.
With respects to the funding provided by the Colorado Department of Natural Resources to complete Inundation Mapping for the Sheriff Reservoir.

CERTIFICATE HOLDER | Y | ADDITIONAL INSURED; INSURER LETTER: A

Colorado Department of Natural Resources
John Batka
1313 Sherman Street # 718
Denver, CO 80203
USA

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE Jill Ludbury

September 1, 2016

Project: Inundation Mapping for Sherriff Dam

Vendor: Town of Oak Creek
Ms. Mary Alice Page-Allen, Town Administrator
P.O. Box 128
Oak Creek, CO 80467
Phone / email: 970-736-2422 / maryalice@townofoakcreek.com

Consultant: W.W. Wheeler & Associates, Inc.
Ms. Danielle Hannes, P.E.
3700 Inca Street
Englewood, CO 80110-3405
Phone / email: (303) 761-4130 / Danielle.hannes@wwwwheeler.com

CWCB funding source: Severance Tax Trust Fund Operational Account

SCOPE OF WORK

W.W. Wheeler, Inc. (Consultant), at the direction of the Town of Oak Creek (Vendor), will perform a dam breach modeling study and associated flood inundation mapping for the above structure which they are the owner of. Sherriff Dam is a High Hazard dam located in Routt County and is tributary to Trout Creek within the Yampa River Basin. A breach analysis and inundation mapping will be performed from the dam along Trout Creek to a point where impacts to public safety are negligible. This is expected to be occur the confluence of Trout Creek and the Yampa River which is located approximately 40 miles downstream.

Consultant or Vendor will submit the final report and mapping to the Colorado Division of Water Resources, Dam Safety Branch, for approval. Grant funds will not be disbursed until the project has been approved by the Dam Safety Branch.

PROPOSED METHODOLOGY

The Consultant shall perform a clear dam breach analyses in accordance with the State of Colorado Rules and Regulations for Dam Safety and Dam Construction (1/1/2007), and the Dam Safety Guidelines for Dam Breach Analysis (2/10/2010). Correspondence shall be with Dana Miller, P.E., of the Colorado Division of Water Resources, Dam Safety Branch, to present preliminary dam breach parameters, water surface profile modeling, and inundation mapping and to determine if field measurements are necessary for critical bridges.

Inundation mapping for High Hazard dams shall show the calculated extents of the dam breach flood wave. The mapping will also include cross sections at critical locations showing lateral and vertical flood extents, flood wave velocity, and flood wave arrival time. Inundation mapping shall be extended downstream to a location where no potential for loss of life and/or no significant property damage exist.

Inundation mapping for Significant Hazard dams shall show the route of the dam breach flood wave, the estimated time of arrival of the flood wave at critical sections, and the estimated lateral extent of inundation. The inundation mapping shall be extended downstream to a location where no significant

property damage exists. The inundation mapping requirements for Significant Hazard dams may be modified for good cause, with the approval of the State Engineer.

DELIVERABLES

The Vendor shall provide the CWCB electronic copies of the following: Final Report for the inundation mapping analysis stamped by a licensed Colorado professional engineer, and inundation maps. Additionally the Vendor shall provide a copy of the project's approval letter from the Colorado Division of Water Resources, Dam Safety Branch.

SCHEDULE

Work may initiate on the date of the State's Purchase Order. Deliverables are due no later than June 15, 2017.

BUDGET

The Consultant will complete the work described for a not-to-exceed budget of $9,902 based on Consultant's current rate schedule and projection of effort. The estimate is summarized. The Consultant shall invoice Vendor on a Time and Materials basis for services performed below:

Task: Breach Routing, Flood Routing	Budget
Sherriff Dam	$9,902

PAYMENT

The State shall pay Vendor up to $9,200 (93 % of Project Cost) for Consultant's project related invoices following receipt of final deliverables. The Vendor is responsible for all expenses in excess of the State's contribution. Any overages or increases in project costs shall be the responsibility of the Vendor.

Estimated Project Cost Sharing:	
Owner Match	$ 702
CWCB Grant	$ 9,200
TOTAL	$ 9,902

CWCB shall issue payment following receipt and processing of Vendor's Request for Payment submittal. The Request for Payment must include: a summary of Consultant's labor effort and direct costs in accordance with the attached estimate, copies of corresponding invoices from Consultant, and identification of any major issues with proposed or implemented corrective actions. The Deliverable, including the Dam Safety Branch's approval letter, must be provided to the CWCB as part of project documentation prior to CWCB issue of payment.

PROPOSAL - ENGINEERING SERVICES

Dam Inundation Mapping

Sheriff Dam

Submission Deadline: 5:00 PM, Friday, July 28, 2016

SUBMITTED TO:

TOWN OF OAK CREEK
maryalice@townofoakcreek.com

Please direct any questions on the proposal to:

W. W. WHEELER
& ASSOCIATES, INC.
Water Resources Engineers
3700 S. Inca St. | Englewood, CO 80110-3405
303-761-4130 | Fax 303-761-2802

Danielle Hannes, P.E. *(Prepared the Proposal)*
Danielle.hannes@wwwheeler.com
303-761-4130
or
Stephen L. Jamieson, P.E.
Steve.jamieson@wwwheeler.com
303-761-4130

W. W. WHEELER
& ASSOCIATES, INC.
Water Resources Engineers

WWW.WWWHEELER.COM

July 28, 2016

Ms. Mary Alice Page-Allen
Town of Oak Creek
PO Box 128
Oak Creek, Colorado 80477
maryalice@townofoakcreek.com

RE: Proposal - Engineering Services – Dam Inundation Mapping

Dear Ms. Page-Allen:

W. W. Wheeler and Associates, Inc. (Wheeler) is pleased to submit this proposal for professional engineering services related to providing dam breach flood inundation mapping for Sheriff Dam located in Rio Blanco County, Colorado.

Based on our discussions with Dana Miller, Division 6 Dam Safety Engineer, it is our understanding is that the analyses and models used for preparing the inundation maps could potentially be used in an incremental damage assessment (IDA) to size spillway modifications at Sheriff Dam. As a result, we will prepare our inundation models and perform our site visit with the understanding that the analyses maybe used for both the inundation analyses and an IDA. However; we understand that the Scope of Work (SOW) for this proposal is only for the inundation mapping. As a result, this proposal is to perform the inundation mapping associated with a breach of Sheriff Reservoir.

Qualifications

W. W. Wheeler and Associates, Inc. is a consulting firm that specializes in the field of water resources engineering. W. W. (Pete) Wheeler established the company in 1955. Since its creation, it has successfully provided quality engineering services for a diverse clientele including irrigation companies, individual landowners, large utility and mining companies, commercial water users, and government entities. Wheeler is based in Englewood, Colorado, and performs the majority of its projects in Colorado but has also completed several projects nationwide.

Wheeler maintains a highly professional staff of 17 engineers that are well known for excellence and integrity in the field of water resources engineering specializing in hydrologic and hydraulic modeling; inundation mapping; and several dam related specialty tasks including risk assessments, hazard classification assessments, dam inspections, dam design and cost estimations.

3700 S. Inca Street | Englewood, CO 80110-3405
303-761-4130 | FAX 303-761-2802

Wheeler is very familiar with the Emergency Action Plan (EAP) inundation mapping format that is required by the Dam Safety Branch (DSB) of the Colorado Division of Water Resources (DWR) and has recently prepared numerous inundation maps and EAPs in Colorado that have been accepted by the DSB. See Attachment 1 for a list of inundation maps recently prepared, reviewed, and accepted by the Colorado DSB.
Key references and client contact information is listed below for recently completed inundation maps. We also encourage the Town of Oak Creek to contact the Colorado DSB Dam Safety Engineer to discuss Wheeler's experience with preparing dam inundation mapping.

References

Bergen Ditch and Reservoir Company
Bob Easton
reaston829@comcast.net
(303) 470-0774

Double El Conservation District
George Fosha
gsfosha@skybeam.com
(719) 347-3132

Xcel Energy
Bruce Cotie
bruce.e.cotie@xcelenergy.com
(303) 273-4917

Project Approach

Wheeler's work will be initiated with a site visit to discuss the project with the Town of Oak Creek; collect key data about the dam and downstream bridges and culverts; and visit key reaches of the channels downstream of the dam. In addition, Wheeler will visit areas and document downstream structures that can potentially be used in a future IDA analysis. The inundation maps will show only the inundation limits associated with a sunny day dam failure which is required by the DSB.

Wheeler reviewed the documents provided with the Request for Proposals (RFP). In addition to the documents provided, it would be helpful if the Town of Oak Creek or the DSB could provide a reservoir storage capacity curve.

Wheeler will use the pertinent data about the dams and reservoirs to simulate the dam-failure using the Froehlich Method or MacDonald & Langridge-Monopolis Method with Washington State failure times, where appropriate, in accordance with the Colorado DSB breach guidelines. The dam-breach analysis would be based on computer simulations using the U.S. Army Corps of Engineers (USACE) HEC-HMS program.

Wheeler proposes to use unsteady flow routing within HEC-RAS 5.0.1 for the downstream inundation zone using one-dimensional or two-dimensional flood routing, where applicable.

For the model terrain, Wheeler will use the 1/3 arc second (~10m) National Elevation Dataset (NED) unless if higher resolution data is provided at no additional cost to Wheeler. Cross-sections will be extracted using the HEC-GeoRAS ArcGIS extension developed by the USACE then imported into USACE HEC-RAS River Analysis System computer model. Although the "Scope of Work" indicates that a "Simple" Level of Analysis is required based on the Guidelines for Dam Breach Analysis which includes a Steady State HEC-RAS model, Wheeler plans to simulate the routing of the breach hydrograph using the Unsteady flow option in the HEC-RAS model or the "Intermediate" Level of Analysis. The unsteady flow option will provide attenuation of the peak water surface, which we believe provides a more realistic termination point for the flood inundation map and is nearly the same cost as providing a steady state HEC-RAS model analysis. Also, an unsteady flow model will be used in the IDA, if this analysis is needed in the future.

Breach flows will discharge into Trout Creek. Trout Creek extends from Sheriff Dam to the Yampa River with the confluence approximately 40 miles downstream. The inundation mapping will be terminated at a location that meets the DSB's guidelines, where the dam breach flood impacts are negligible. Wheeler will collect additional information on the downstream floodplain if it is thought that this will impact the IDA.

The inundation boundary will be imported into ArcGIS as a shapefile. Wheeler will use the most recent color aerial photos from ArcGIS online as a map base, unless if more recent or higher resolution aerial imagery data is provided at no additional cost to Wheeler. The mapping will include data boxes at key downstream cross-sections that will summarize the following key information: distance downstream of dam, peak discharge, peak flood depth, maximum flood wave velocity, estimated flood wave arrival time, and estimated time of maximum flood stage. The inundation mapping will be produced on 11-inch x 17-inch sheets with a scale of approximately 1 inch=1,000 feet with an index cover sheet. A brief analysis memorandum will be provided for the EAP that documents our key assumptions, analysis methods, and results of our dam-failure analyses. The mapping will be prepared to meet the requirements of the DSB, including call outs for roads, highways and critical infrastructure.

Wheeler will provide the following project deliverables:

1. A brief technical memorandum that documents key assumptions, analysis methods, and results used to generate the inundation mapping.
2. Hard copies of the inundation mapping produced on 11-inch by 17-inch paper at a scale of approximately 1 inch = 1000 feet, or higher resolution.
3. Two CDs,/DVDs which include the digital GIS inundation mapping files; HEC-HMS files; HEC-RAS files; PDF files of the inundation maps; and additional supporting documentation.

Wheeler anticipates preparing draft mapping documents for review by the DSB and the Town of Oak Creek, and incorporating review comments into the final documents for distribution.

Project Schedule and Available Staff

With respect to the schedule, we can provide a draft of this work for the DSB review within 90 to 120 days from the Notice-to-Proceed from the Town of Oak Creek. See the milestone schedule in the table below:

Table 1 - Milestone Schedule

Site Visit	Complete within 30 days of Notice-to-Proceed (weather permitting)
Draft Deliverables to Colorado DWR and Town of Oak Creek for Review	Complete within 75 days of Notice-to-Proceed
Final Deliverables	Complete within 30 days after receiving comments from the Town of Oak Creek and the Colorado DWR.

Depending on the timing of the Project, Danielle T. Hannes, P.E. or Stephen L. Jamieson, P.E. will serve as the Project Manager. Danielle Hannes is a Staff Engineer at Wheeler with more than ten years of experience in civil engineering, primarily in the area of water resources and has prepared or reviewed more than 25 inundation analyses in the last 10 years. Steve Jamieson is Principal Engineer at with more than 33 years of dam engineering experience.

The inundation analysis will be performed by Christine Mugele, P.E. or Andrea Fasen, E.I. Both Ms. Mugele and Ms. Fasen have recently prepared several inundation maps that have been reviewed and approved by the Colorado DSB. Both engineers have availability to perform the work and can be available to meet the three to four month desired completion schedule. Resumes for our Project Staff are provided in Attachment 2.

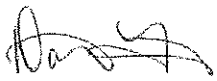
Budget and Schedule

Wheeler's professional engineering services will be performed in accordance with our Engineering Services Agreement (Attachment 4) and our invoices will be based on our Standard Rate Schedule provided in Attachment 3.

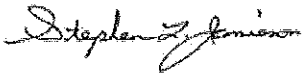
We can complete the work described in this proposal for not-to-exceed budget of $9,902. See Attachment 3 for the breakdown of the fees. Our total fee for this work will not be exceeded without prior authorization from the Town of Oak Creek.

We appreciate the opportunity to provide you with this proposal.

Sincerely,
W. W. Wheeler & Associates, Inc.



Danielle Hannes, P.E.



Stephen L. Jamieson, P.E.

t:\2016\pb16.02_sheriff_dam_inundation\160728_inundation_sheriffdam.docx

Attachment 1

Wheeler Experience Inundation Mapping

ATTACHMENT 1
WHEELER EXPERIENCE
DAM INUNDATION MAPPING

	Project	Year	Location	Client	Key Staff				Cost	Notes
					S. Jamieson	D. Hannes	C. Mugele	A. Pasen		
1	Antero Dam	2007	Park County CO	Denver Water	✓				$77,000	Includes 7 Inundation Maps
2	Aurora Rampart Dam	2008	Arapahoe County CO	Aurora Water	✓	✓			N/A	
3	Beliste (Plant) Reservoir	2008	Arapahoe County CO	City of Englewood		✓			$20,000	Includes 2 Inundation Maps
4	Benchmark Dam (Nottingham Lake)	2013	Eagle County, CO	Town of Avon	✓		✓		$16,000	Includes Inundation Maps and EAP
5	Bergen No. 1 Dam	2015	Jefferson County, CO	Bergen Ditch Company			✓		$17,400	Includes 2 Inundation Maps
6	Bergen No. 2 Dam	2015	Jefferson County, CO	Bergen Ditch Company			✓		$17,400	Includes 2 Inundation Maps
7	Bowles Dam	2015	Jefferson County, CO	Joseph W. Bowles Reservoir Company			✓		$10,000	
8	Cheesman Lake Dam	2007	Park County CO	Denver Water	✓				$77,000	Includes 7 Inundation Maps
9	Clear Lake Dam	2008	Clear Creek County CO	Xcel Energy	✓				$31,900	Includes Inundation Mapping for 3 dams
10	Climax 5 Dam (Tailings Dam)	2010	Summit County CO	A Freeport-McMoRan Company		✓			$25,000	Includes Inundation Maps and EAP
11	Comanche Dam	2016	Comanche County, OK	U.S. Fish and Wildlife Services	✓	✓	✓		N/A	Task Order includes several tasks.
12	DeWeese Dam	2013	Custer County, CO	DeWeese-Dye Ditch & Reservoir Company	✓	✓			$9,900	
13	Dorris Dam	2015	Modoc County, CA	U.S. Fish and Wildlife Services	✓		✓		N/A	Task Order includes several tasks.
14	Eleven Mile Reservoir Dam	2007	Park County CO	Denver Water	✓				$77,000	Includes 7 Inundation Maps
15	Evans Gulch Dam	2010	Lake County CO	Parkville Water District	✓	✓			N/A	
16	Evergreen Dam	2009	Jefferson County, CO	Evergreen Water District	✓				$11,000	
17	Fisher Peak No. 1 Dam	2014	Las Animas County, CO	City of Trinidad		✓		✓	$25,000	Includes 3 Inundation Maps
18	Fisher Peak No. 2 Dam	2014	Las Animas County, CO	City of Trinidad		✓		✓	$25,000	Includes 3 Inundation Maps
19	Grama Dam	2016	Comanche County, OK	U.S. Fish and Wildlife Services	✓	✓	✓		N/A	Task Order includes several tasks.
20	Harriman Lake Dam	2007	Denver County CO	Denver Water	✓	✓			$77,000	Includes 7 Inundation Maps
21	Jefferson Lake Dam	2008	Park County CO	Aurora Water	✓	✓			N/A	
22	Jessup Mill Pond Dam	2015	Flathead County, MT	U.S. Fish and Wildlife Service	✓	✓			N/A	Task Order includes several tasks.
23	Johnston Dam	2014	Jefferson County, CO	Foothills Park and Recreation District		✓		✓	$10,000	
24	Lower Cabin Creek Dam	2008	Clear Creek CO	Xcel Energy	✓				$31,900	Includes 3 Inundation Maps
25	Marston Lake Dam	2007	Denver County CO	Denver Water	✓	✓			$77,000	Includes 7 Inundation Maps
26	Matheson Dam	2016	Grand County, CO	Matheson Ranch		✓		✓	$10,000	
27	McLellan Reservoir	2008	Englewood CO	City of Englewood		✓			$20,000	Includes 2 Inundation Maps
28	Meadow Creek Dam	2011	Grand County, CO	City of Englewood	✓				$14,300	
29	Monument Lake Dam	2013	Las Animas County, CO	City of Trinidad					N/A	
30	Mountain Lake Dam	2010	Lake County CO	Parkville Water District	✓	✓			N/A	
31	Musgrave Dam	2016	Grand County, CO	Scholl Ranch		✓		✓	$19,000	Includes 2 Inundation Maps
32	North Lake Dam	2011	Las Animas County, CO	City of Trinidad		✓			$27,000	Includes EAP, Tabletop, & Inundation Maps.
33	Pinon Canon Dam	2014	Las Animas County, CO	City of Trinidad		✓		✓	$25,000	Includes 3 Inundation Maps
34	Platte Canyon Dam	2007	Denver CO	Denver Water	✓				$77,000	Includes 7 Inundation Maps
35	Polly Deane Dam	2015	Jefferson County, CO	Bergen Ditch Company			✓		$10,000	
36	Quincy Dam	2008	Douglas County CO	Aurora Water	✓	✓			N/A	
37	Ralston Lake Dam	2007	Denver CO	Denver Water	✓				$77,000	Includes 7 Inundation Maps
38	Ramah Dam	2014	El Paso County, CO	Double El Conservation District		✓		✓	$11,500	Inundation Map Includes 2 breaches
39	Ritschard Dam (Wolford Mountain Reservoir)	2009	Grand County, CO	Colorado River Water Conservation District	✓				$11,000	
40	Robinson Lake Dam	2008	Eagle County CO	A Freeport-McMoRan Company		✓			$15,000	
41	Scholl Dam	2016	Grand County, CO	Scholl Ranch		✓		✓	$19,000	Includes 2 Inundation Maps
42	Senac Dam (Aurora Reservoir)	2008	Douglas County CO	Aurora Water	✓	✓			N/A	
43	Spinney Mountain Dam	2008	Park County CO	Aurora Water	✓				N/A	
44	Storrie Lake Dam	2009	San Miguel County NM	Storrie Water Users' Association	✓	✓			$22,000	Includes EAP, Inundation maps, & breach analyses
45	Upper Tule Dam	2015	Denver County CO	Patrick Bennett Reservoir Company			✓		$9,000	
46	Ziegler Dam	2011	Pitkin County CO	Snowmass Water and Sanitation District		✓			N/A	Task Order includes several tasks.

N/A - Costs Not Available

Attachment 2

Personnel Resumes

Stephen L. Jamieson, P.E.
Principal Engineer

W. W. Wheeler & Associates, Inc.
3700 S. Inca Street | Englewood, CO 80110
303.761.4130 | steve.jamieson@wwwheeler.com

PROFESSIONAL HISTORY

W. W. Wheeler & Associates, Inc., 2001 to present
GEI Consultants, Inc., 1990-2001
Denver Water Department, 1983 to 1990

EDUCATION

B.S. Civil Engineering, Colorado State University, 1982
M.S. Civil Engineering, University of Colorado at Denver, 1989

MEMBERSHIPS, AFFILIATIONS, AND CERTIFICATIONS

Registered Professional Engineer (Colorado, New Mexico, North Dakota, Washington)
American Society of Civil Engineers
(Task Committee on Instrumentation and Monitoring Dam Performance)
Association of State Dam Safety Officials
United States Society on Dams

TECHNICAL SPECIALTIES

Mr. Jamieson is a registered professional engineer specializing in dam safety engineering, dam risk assessments, and dam design, construction, inspection, and operations. He has more than 33 years of dam safety engineering experience and he has worked on more than 250 dam engineering projects in 25 different states. His experience involves evaluation or design of embankment, rock-fill, timber crib, concrete gravity, concrete arch, and roller compacted concrete dams. He has had a leadership role in four different dam design projects that were recognized with national awards. He is a FERC-approved Potential Failure Modes Assessment (PFMA) facilitator and has been the FERC-approved Independent Consultant responsible for conducting FERC Part 12 dam safety inspections for several high hazard-potential dams.

REPRESENTATIVE PROJECT EXPERIENCE

Dam Safety Consultant, U.S. Fish & Wildlife Service (1990-2016)

Mr. Jamieson has continuously served as a key dam safety consultant for 26 years to the U.S. Fish & Wildlife Service (FWS) Dam Safety Program. Wheeler is one of three firms recently awarded a nationwide, five-year dam safety contract with the FWS. As the current and previous project manager, Mr. Jamieson has successfully managed hundreds of dam evaluation, design, and construction projects during this period. The work has included well over 50 Inflow Design Floods (IDF) evaluations, hundreds of dam safety inspections, inundation analyses, hazard classifications, hydraulic and structural analyses, and more than 15 dam modification designs. He has participated in risk assessments, prepared Emergency Action Plans (EAP), Standing Operating Procedures (SOP), and conducted dam safety inspection training programs for numerous FWS dam operators.

U.S. Fish & Wildlife Service (FWS) Project Management Class
Mr. Jamieson was a key team member that developed and taught a project management class for FWS engineers and architects from across the country. The class included the development of a Project Management Plan template and several FWS project management tools.

Clear Lake Dam Replacement, Xcel Energy
Mr. Jamieson is the current Project Manager and Engineer-of-Record for the replacement of a 110-year-old earth dam with a new Roller Compacted Concrete (RCC) Dam for Xcel Energy at an elevation of about 10,000 feet. The design included a unique, weighted excess runoff approach for the IDF that was approved by both FERC and the Colorado SEO. The work has included successful coordination and work with a FERC-required Board-of-Consultants (BOC). Mr. Jamieson facilitated a construction PFMA workshop and numerous design and construction workshops with the BOC, the design team, Xcel Energy, and dam safety engineers from the Colorado SEO and several FERC offices. Project construction will be complete in June of 2016.

Stagecoach Spillway Replacement, Xcel Energy
Mr. Jamieson was the Project Manager and Engineer-of-Record for a spillway replacement project at Xcel Energy's Electra Lake reservoir near Durango, CO. The project is located at an elevation of about 8,400 feet. The IDF was developed based on evaluation of three sub-basins with a significant diversion into the basin. The IDF was approved by both FERC and the Colorado SEO. The project was successfully completed in 2014. The project also included the facilitation of a design and construction PFMA workshop and preparation of a PFMA report.

Dam-Failure Inundation Mapping
Mr. Jamieson has managed projects and reviewed analyses for updating dam-failure flood inundation maps for more than 30 high or significant hazard dams over his career; most of which have been in the State of Colorado. The inundation maps prepared in Colorado have been reviewed and approved by the Colorado Division of Water Resources Dam Safety Branch.

Guanella Dam, near Empire, Colorado, for the City of Golden
Project Manager and Engineer-of-Record responsible for design and construction of an $11 million, off-channel water supply reservoir. The work included a detailed Probable Maximum Flood IDF report that addressed the potential dam-failure during flooding of upstream mining dams. The IDF and project construction was approved by the Colorado SEO. The project included innovative spillway designs that saved more than $3 million in spillway construction costs. The project won three national awards in 2005 from the United States Society of Dams, the American Council of Engineering Companies, and the American Public Works Association.

ASDSO EAP Class
Since 2006, Mr. Jamieson has been one of the key instructors for the Association of State Dam Safety Officials course on emergency action planning. The course has been taught to more than 600 people nationwide and includes an evaluation of dam inflow flooding.
Mr. Jamieson facilitated the Potential Failure Modes Analysis (PFMA) dam safety risk assessment workshop for Dillon Dam. The PFMA report was approved by FERC for this very important component of Denver Water's water supply system.

DANIELLE TRIPP HANNES, P.E.
PROFESSIONAL ENGINEER

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303.761.4130 | DANIELLE.HANNES@WWWHEELER.COM

PROFESSIONAL HISTORY

W. W. Wheeler & Assoc., Inc., Associate Engineer, 2007 to present
Colorado State University, Graduate Research Assistant in Hydrology, 2005 to 2007
CPP Engineering, Inc., Design Engineer, 2004 to 2005

EDUCATION

M.S. Civil Engineering- Hydrology, 2007, Colorado State University, Fort Collins, CO
B.S. Civil Engineering (cum laude), 2004, University of Wyoming, Laramie, WY

MEMBERSHIPS, AFFILIATIONS, AND CERTIFICATIONS

Professional Engineer, Colorado
Association of State Dam Safety Officials (ASDSO)
American Water Resources Association (AWRA)

TECHNICAL SPECIALTIES

Danielle Tripp Hannes is an associate engineer at W. W. Wheeler & Associates, Inc. She has more than ten years of experience in civil engineering, primarily in the area of water resources. Ms. Hannes' experience includes risk assessments; hazard classification assessments; flood inundation mapping; water rights assessments; dam inspections; construction inspection; design and cost estimations; and hydrologic and hydraulic modeling. She is proficient in several computer modeling programs including ArcGIS, HEC-RAS, HECGeoRAS, HEC-1, HEC-HMS, AutoCAD, FLO-2D, Modflow, WaterCAD, Matlab, and Microsoft Office.

APPLICABLE TECHNICAL TRAINING AND EDUCATION

Project Management Workshop, Denver Colorado, February, 2016.
HEC-RAS 5.0 Training, New Orleans, LA, September 2015.
HEC-RAS 5.0.1 Training, Denver, CO, May 2016.
Association of State Dam Safety Officials Annual Conference, 2010, 2011, 2012, 2015.
United States Society on Dams Annual Conference, 2013, 2016.
Hazard Classification and Flood Hydrology Technical Seminar, Colorado Division of Water Recourses, April 2011.
Workshop on Dam Break Analysis Applied to Tailings Dams, United States Society on Dams (USSD), August 2011.
Best Practices in Dam Safety Risk Analysis Class, Bureau of Reclamation, November 2011.

REPRESENTATIVE PROJECT EXPERIENCE

Flood Inundation Mapping & Emergency Action Plan (EAP) Experience
Ms. Hannes has prepared or reviewed more than 25 inundation maps in the last ten years; most of which have been in the State of Colorado which have been reviewed and approved by the Colorado Division of Water Resources Dam Safety Branch. The flood inundation work included

computer simulations of dam failure using the U.S. Army Corps of Engineers (USACE) HEC-1 or HEC-HMS program. The downstream inundation floodplain modeling was developed for each inundation map using one-dimensional or two-dimensional modeling capabilities, using either FLO-2D, HEC-RAS with the HECGeoRAS ArcGIS extension, HEC-RAS 5.0.1, or combinations thereof. The channel routing of the breach hydrograph was simulated for each of the inundation maps using unsteady flow in HEC-RAS or FLO-2D to provide realistic termination points for each map.

Ms. Hannes has also prepared and tested several Emergency Action Plans for high and significant dams that are owned and operated by various Cities, water districts, and government entities. Ms. Hannes has conducted functional or table-top EAP exercises with local emergency management officials in Colorado, Montana, North Dakota, Oklahoma, and Maryland. These EAP exercises have provided valuable insight in the development of the inundation maps to ensure the pertinent information is included in the inundation maps for emergency responders to perform their duties effectively.

Sheldon National Wildlife Refuge Dam Inspections, Hydrology, and Hazard Classification
Ms. Hannes performed initial and follow-up Safety Evaluation of Existing Dams (SEED) inspections for seven dams on the Sheldon National Wildlife Refuge in Nevada for the U. S. Fish and Wildlife Service (FWS). Following the initial inspections, she performed a hazard classification evaluation and breach analysis for each dam to determine the associated hazard, which dictates the required inflow design flood (IDF). Ms. Hannes then evaluated the spillway capacities for routing the required IDF and recommendations were made for modifying the spillway or dam to safely route the IDF under the FWS policy.

Upper Spring Creek Dam Rehabilitation Project
Ms. Hannes prepared a Conceptual Remediation and Cost Study for Upper Spring Creek Dam for the City of Steamboat Springs. As part of this evaluation, Ms. Hannes performed an inspection of the dam and identified key dam safety issues; developed the IDF to evaluate and size the spillway; proposed conceptual level remedies for the identified issues; and provided the City of Steamboat Springs with conceptual level costs associated with each of the proposed remedies for the identified issues.

Stagecoach Spillway Replacement Project
In 2011 through 2013, Ms. Hannes served as the Project Engineer and Resident Engineer for the Stagecoach Spillway Replacement Project at Electra Lake, near Durango Colorado, owned by Xcel Energy. The Stagecoach Spillway Replacement Project involved demolition of the existing Stagecoach Dam and Spillway replacing the spillway with a two-cycle, reinforced concrete, labyrinth weir with embankment backfill on both sides of the new spillway. Ms. Hannes prepared feasibility designs of several alternatives prior to the selected alternative, prepared a detailed hydrologic analysis of the drainage basin, prepared design plans and specifications, developed FLO-2D models and HEC-RAS models of the downstream channel, developed several engineering calculations for the project, worked with structural and geotechnical engineers, review agencies, and Xcel Energy to prepare the final design package. Ms. Hannes also presented and participated in the Construction PFMA workshop. Ms. Hannes served as the full-time resident engineer through construction in the summer and fall of 2013, assisted in preparation of the Record Drawings and Final Construction Report.

CHRISTINE B. MUGELE, P.E.

ENGINEER

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PROFESSIONAL HISTORY

W. W. Wheeler and Assoc., Inc., 2013 to present
CDM Smith, 2007 to 2013

EDUCATION

M.S. Civil Engineering, 2009, University of Colorado at Boulder
B.S. Civil Engineering, 2007, University of North Florida

MEMBERSHIPS, AFFILIATIONS, AND CERTIFICATIONS

Professional Engineer, Colorado
Association of State Dam Safety Officials (ASDSO)
American Society of Civil Engineers
American Water Resources Association (AWRA)

TECHNICAL SPECIALTIES

Christine Mugele is an assistant engineer at W. W. Wheeler & Associates, Inc. She has nine years of experience in civil engineering, primarily in the area of water resources. Ms. Mugele's experience includes flood inundation mapping, water rights assessments, feasibility-level design, watershed planning, and hydrologic and hydraulic modeling, design, and calculations. She is proficient in several computer modeling programs including ArcGIS, HEC-RAS, HECGeoRAS, HECGeoHMS, HEC-1, HEC-HMS, AutoCAD, FLO-2D, KYPipe, and Microsoft Office and Excel.

REPRESENTATIVE PROJECT EXPERIENCE

Flood Inundation Mapping & Emergency Action Plan (EAP) Experience

Ms. Mugele has prepared several flood inundation maps for clients in Colorado and nationwide. Flood inundation mapping work includes dam breach analyses for the Sunny Day dam failure and/or Probable Maximum Flood (PMF) dam failure simulated using U.S. Army Corps of Engineers (USACE) HEC-1 or USACE HEC-HMS computer program. Overland flooding and channel routing of the breach flood wave was completed using unsteady USACE HEC-RAS or FLO-2D models to determine downstream flood limits. The channel routing models were developed using HEC-GeoRAS in ArcGIS using best available topographic mapping from either survey, digital elevation models (DEMs) or LiDAR data. Final inundation maps were developed based on the results of the simulated dam failure using ArcGIS. Ms. Mugele also helped develop dam breach flood flow animations (videos) for the FWS dams to assist in periodic tests of the Emergency Action Plans. The following inundation maps were developed by Ms. Mugele:

Benchmark Dam (Nottingham Lake), Town of Avon
Polly A. Dean Dam, Bergen Ditch Company
Bergen No. 1 Dam, Bergen Ditch Company
Bergen No. 2 Dam, Bergen Ditch Company

Bowles #1 Dam, Bowles Reservoir Company
Upper Tule Dam, Patrick Bennett Reservoir Company
Dorris Dam, U.S. Fish and Wildlife Service
Grama Dam, U.S. Fish and Wildlife Service, FWS
Comanche Dam, U.S. Fish and Wildlife Service

Wichita Mountains Wildlife Refuge - Hazard Classification Evaluations & Dam Inspections
In October 2015 Ms. Mugele performed initial Safety Evaluation of Existing Dams (SEED) inspections for dams on the Wichita Mountains Wildlife Refuge in Oklahoma for the U.S. Fish and Wildlife Service (FWS). Following the inspections, she prepared hazard classification evaluations and breach analyses for five dams on the Refuge to determine their associated hazard, which dictates the required inflow design flood (IDF). Ms. Mugele also evaluated the spillway capacities for routing the required IDF and recommendations were made for modifying the spillway or dam to safely route the IDF under the FWS policy.

Bearce Flowage Dam Hazard Classification, U.S. Fish and Wildlife Service
Ms. Mugele prepared a hazard classification evaluation for Bearce Flowage Dam located on the Moosehorn National Wildlife Refuge in southeast Maine. Ms. Mugele developed the dam breach assessments for the sunny day dam failure and several increments of the Probable Maximum Flood (PMF) dam failure of Bearce Flowage Dam. She performed downstream routing of the dam breach flows using HEC-RAS and evaluated the potential hazards associated with a dam breach at structures located downstream of the dam. Ms. Mugele documented the results in a hazard classification report for the FWS.

Craig Pond Dam Hazard Classification, U.S. Fish and Wildlife Service
Ms. Mugele prepared a hazard classification evaluation for Craig Pond Dam located on the Brook National Fish Hatchery in southern Maine. Ms. Mugele developed the dam breach assessments for the sunny day dam failure and several increments of the Probable Maximum Flood (PMF) dam failure of Craig Pond Dam. She performed downstream routing of the dam breach flows using HEC-RAS and evaluated the potential hazards associated with a dam breach at structures located downstream of the dam. Ms. Mugele documented the results in a hazard classification report for the FWS.

Los Angeles U.S. Army Corps, Santa Clara River Water Feasibility Study, California
Ms. Mugele was responsible for developing the hydraulic models using the USACE HEC-RAS River Analysis System computer model for the Santa Clara River and tributaries which involved over 30 separate hydraulic models and development of 100-year and 500-year floodplains associated with those models. The work included Geo-RAS development of all modeled cross-sections, bank stations, flow paths and post-processing floodplain delineation using HECGeoRAS. Ms. Mugele was also responsible for the development of overflow analysis report and figures describing the work completed for the project.

Pawnee Creek Channel Improvements, Logan County Water Conservancy District
Ms. Mugele served as the project engineer for the design of a channel improvement project on Pawnee Creek to aid in the prevention of flooding in Logan County, Colorado. Ms. Mugele developed hydraulic modeling using FLO-2D to design of the channel improvements for the 100-year and 10-year flood events. Ms. Mugele also assisted in writing the Flood Alternative Analysis report.

ANDREA D. FASEN, E.I.
ENGINEER

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303.761.4130 | ANDREA.FASEN@WWWHEELER.COM

PROFESSIONAL HISTORY

W. W. Wheeler & Associates, Inc., 2014 to present
Yosemite National Park, Summer Intern 2012
USDA Forest Service, 2010 and 2011 Summer Intern

EDUCATION

M.S. Civil Engineering, Emphasis in Hydraulic Engineering, Stream Restoration & River Mechanics, Colorado State University, 2014
B.S. Civil Engineering, Colorado State University, 2013

MEMBERSHIPS, AFFILIATIONS, AND CERTIFICATIONS

Engineering Intern, Colorado
Association of State Dam Safety Officials (ASDSO)
American Water Resources Association (AWRA)

TECHNICAL SPECIALTIES

Andrea Fasen is a junior engineer at W. W. Wheeler & Associates, Inc. specializing in water resources. Her internship experience includes two summers of surveying for the USDA Forest Service and hydraulic modeling of domestic and fire service water supply for the design and engineering branch of Yosemite National Park. At W. W. Wheeler & Associates, Andrea has performed hydraulic and hydrologic modeling, prepared flood inundation maps, performed design calculations for dam modifications, and participated in several dam safety inspections. She is proficient in several computer modeling programs and software including ArcGIS, HEC-RAS, HECGeoRAS, HEC-HMS, HEC-1, AutoCAD, Bentley WaterCAD, Matlab, FishXing, SRH-2D and Microsoft Office.

REPRESENTATIVE PROJECT EXPERIENCE

Flood Inundation Mapping

Andrea Fasen has prepared eight inundation maps in the last three years in the State of Colorado. The inundation maps were successfully reviewed and approved by the Colorado Division of Water Resources Dam Safety Branch. The flood inundation work included computer simulations of dam failure using the U.S. Army Corps of Engineers (USACE) HEC-1 or HEC-HMS program. The downstream inundation floodplain modeling was developed for each inundation map using one-dimensional or two-dimensional modeling capabilities, using either FLO-2D, HEC-RAS with the HECGeoRAS ArcGIS extension, HEC-RAS 5.0.1, or combinations thereof. The channel routing of the breach hydrograph was simulated for each of the inundation maps using unsteady flow in HEC-RAS to provide realistic termination points for each map. The inundation maps that are included in the Emergency Action Plans were developed in ArcGIS. Ms. Fasen has also assisted in the preparation of several Emergency Action Plans for the City of Trinidad and the U.S. Fish and Wildlife Service (FWS). Ms. Fasen has assisted in the preparation of the following inundation maps:

- Pinon Canyon Dam, Fisher Peak No. 1 Dam, and Fisher Peak No. 2 Dam, (City of Trinidad CO)
- Ramah Detention and Recreation Dam (Double El Conservation District, Simla CO)
- Johnston Dam (Foothills Park and Recreation District, Littleton, CO)
- Matheson Dam (Matheson Ranch, Grand County, Colorado)
- Scholl Dam and Musgrave Dam (Scholl Ranch, Grand County, Colorado)

Hydrology Report – White River National Wildlife Refuge, Arkansas
Ms. Fasen assisted in the development of the 100-year flood hydrology for eleven inventory dams on the White River National Wildlife Refuge located near the confluence of the White River and Mississippi River in Arkansas. The Refuge consists of primarily bottomland hardwood forests and lakes. Streams, sloughs, and bayous branch off of the White and Mississippi Rivers, extending throughout the Refuge, which were investigated for inclusion in the hydrology for each dam. Wheeler performed a site visit to each dam and the associated drainage basin; developed the basin characteristics including drainage areas, unit hydrographs, and infiltration rates; developed key dam pertinent data including dam crest and spillway elevations, and reservoir and spillway capacity curves for both the inventory dams and upstream dams in the watershed; developed a HEC-HMS reservoir routing model that included routing the inflow design flood through each dam and made recommendations for modifying dams and spillways to safely pass the inflow design floods.

MacFarlane Dam Rehabilitation – Jackson County, Colorado
Ms. Fasen assisted in the engineering services related to the rehabilitation design of MacFarlane Dam in Jackson County, Colorado. MacFarlane Dam is a 40-foot-high, homogeneous embankment dam with a crest length of about 1,400 feet originally constructed in 1915. The project is an inter-agency cooperative effort between the FWS, Bureau of Land Management, and a private entity. Several dam safety issues were identified including corrosion and deterioration of the outlet works system, embankment seepage and stability concerns, and concerns over the lack of a cut-off in erodible soils in the spillway channel that could result in a loss of the reservoir. Wheeler initially performed a hazard classification evaluation with updated dam-failure inundation mapping using a two-dimensional downstream water surface profile model (FLO-2D) to confirm that the dam was a low hazard structure and that the appropriate inflow design flood (IDF) for the dam was the 100-year flood event. Ms. Fasen developed the 100-year flood that was used in the spillway design.

Ms. Fasen assisted in the development of the engineering calculations for the designs and cost opinions to rehabilitate the dam. Rehabilitation will consist of constructing a shallow chimney drain and stability berm along the toe of the dam; outlet works modifications including a cost saving concept to encase the severely deteriorated concrete terminal structure, installation of a new HDPE liner in concrete, and converting the terminal structure to a riprap-lined plunge pool; and spillway improvements that include concrete cut-off walls to minimize head cutting and erosion in the spillway channel. Wheeler has complete final designs that were approved by the Colorado Dam Safety Branch and the U.S. Fish & Wildlife Service. The project is scheduled for construction in 2017.

Attachment 3

Cost Proposal Breakdown & Rate Schedule

Attachment 3
Cost Proposal

Project: Sheriff Dam - Engineering Services Dam Inundation Mapping

Date: 28-Jul-16

Wheeler Labor Budget

Task	Labor Cat. $/hr	S. Jamieson $161.00	D. Hannes $117.00	C. Mugele $106.00	A. Fasen $86.00	$0.00	$0.00	Cadd Drafter $75.00	Technician II $61.00	Admin. Asst. $71.00	Labor	Expense	**Total**
Sheriff Dam													
Site Visit - Dam and Downstream Reaches			12		12						$2,436	$80	$2,516
Develop Inundation Analyses					34						$2,924	$320	$3,244
Develop Inundation Maps					6						$516	$0	$516
Memorandum			2		4						$578	$0	$578
SEO Comments & QA Check		2	8		16						$2,634	$0	$2,634
Print & Transmit Final SEED Reports					2.0					2.0	$314	$100	$414
		2.0	**22.0**	**0.0**	**74.0**	**0.0**	**0.0**	**0.0**	**0.0**	**2.0**			
										Subtotal	**$9,402**	**$500**	**$9,902**

Attachment 3
Cost Proposal

Project: Sheriff Dam - Engineering Services Dam Inundation Mapping
Date: 28-Jul-16
Wheeler Expense Budget

Task	Description / unit cost	Airfare $415.000	Mileage (4WD) $0.80	Rental Car $90.00	DIA Parking $24.00	Meals $20.00	Hotel $89.00	Color Copies (Maps) $2.00	Rental Car Gas $50.00	PT Lunches $12.00	Fed-ex $100.00	Total
Sheriff Dam												
Site Visit - Dam and Downstream Reaches			400.0			4.0						$400
Develop Inundation Analyses												$0
Develop Inundation Maps												$0
Memorandum												$0
SEO Comments & QA Check												$0
Print & Transmit Final SEED Reports								50.0				$100
		0.0	**400.0**	**0.0**	**0.0**	**4.0**	**0.0**	**50.0**	**0.0**	**0.0**	**0.0**	**$500**

W. W. WHEELER
& ASSOCIATES, INC.
Water Resources Engineers
WWW.WWWHEELER.COM

STANDARD RATE SCHEDULE
EFFECTIVE APRIL 1, 2016

CLASSIFICATION	RATE/HOUR
Chief Engineer	$177.00
Senior Water Resource Engineer	$161.00
Senior Project Engineer	$150.00
Senior Engineer	$140.00
Project Engineer	$129.00
Staff Engineer	$117.00
Associate Engineer	$106.00
Assistant Engineer	$96.00
Junior Engineer	$86.00
CADD Drafter	$75.00
Administrative Assistant	$71.00
Technician III	$74.00
Technician II	$61.00
Technician I	$49.00

In addition to the above Rate Schedule, the following expense items will be reimbursed to W. W. Wheeler and Associates, Inc. at cost or as indicated:

- Fees by subconsultants, surveyors, laboratories, etc. will include a five percent mark-up
- Prints, photos, and reproductions by others
- Special supplies and equipment
- Out-of-town living expense at cost or per-diem
- In-house reproductions:
  - Black & White $0.15/page
  - Color Letter $1.00/page
  - Color Ledger $2.00/page
- Two-wheel-drive vehicle $0.65/mile
- Four-wheel-drive vehicle $0.80/mile

3700 S. Inca Street | Englewood, CO 80110-3405
303-761-4130 | FAX 303-761-2802

Attachment 4

Engineering Services Agreement

W. W. WHEELER
& ASSOCIATES, INC.
Water Resources Engineers

WWW.WWWHEELER.COM

3700 S. INCA STREET | ENGLEWOOD, CO 80110-3405
303-761-4130 | FAX 303-761-2802

ENGINEERING SERVICES AGREEMENT

THIS IS AN AGREEMENT made as of the 11 day of AUGUST in the year 2016, by and between the Town of Oak Creek (hereinafter called OWNER) and W. W. Wheeler & Associates, Inc. (hereinafter called ENGINEER).

OWNER and ENGINEER in consideration of their mutual covenants herein agree in respect to the performance of professional engineering services by ENGINEER and the payment for those services by OWNER, as set forth below.

ENGINEER shall perform the engineering services as set forth in Exhibit A, a letter proposal dated July 28, 2016 (hereinafter referred to as the PROJECT).

ENGINEER shall perform professional services in accordance with generally accepted engineering practices in this area for the use of OWNER.

OWNER shall pay ENGINEER for services rendered in accordance with the rate schedule, Exhibit B, attached hereto. In the event the PROJECT extends beyond February 29, 2017, a revised schedule with reasonable fee adjustments shall be submitted to the OWNER, and OWNER agrees to pay for services rendered after that date in accordance with the revised schedule.

Daily time sheets will be kept in the office of the ENGINEER, showing the time each person engaged directly on the PROJECT devotes to the work. Records of reimbursable expenses will also be kept by the ENGINEER. These records of time and expenses will be available to audit by OWNER at any time during regular business hours.

ENGINEER shall prepare monthly statements of charges for services rendered and for reimbursable expenses incurred. Such statements shall be submitted to OWNER within fifteen (15) days of the end of each calendar month. Payments of amounts due shall be made by OWNER within thirty (30) days after receipt of each statement.

If OWNER fails to make any payment due ENGINEER for services and expenses within sixty (60) days after receipt of ENGINEER's bill therefore, the amounts due ENGINEER shall include a charge at a rate of 1.5% per month from said sixtieth day plus attorney's fees for collection and in addition, ENGINEER may, after giving seven (7) days written notice to OWNER, suspend services under this Agreement until he has been paid in full all amounts due him for services and expenses.

The work of the ENGINEER may be terminated and this Agreement canceled by the OWNER at any time upon giving ENGINEER ten (10) days prior written notice, in which event OWNER will reimburse ENGINEER for costs incurred or paid and a reasonable fee based thereon up to the effective termination date.

OWNER and ENGINEER have discussed their risks, rewards and benefits of the PROJECT and the ENGINEER's total fee for services. The risks have been allocated such that OWNER agrees that to the fullest extent permitted by law, ENGINEER's total liability to OWNER for any and all injuries, claims, losses, expenses, damages, or claim expenses arising out of this agreement from any cause or causes, shall not shall not exceed ENGINEER's total fee for this PROJECT. Such causes include but are not limited to ENGINEER's negligence, errors, omissions, strict liability, breach of contract or breach of warranty. ENGINEER shall not be responsible for the acts or omissions of any other persons except his own employees and agents performing any of the work on the PROJECT.

IN WITNESS WHEREOF the parties hereto have made and executed this Agreement as of the day and year first above written.

OWNER:

Town of Oak Creek

by _____
(NAME & TITLE)
Mary Alice Pope-Allen
Town Administrator

ENGINEER:

W. W. Wheeler & Associates, Inc.

by _____, President
(NAME & TITLE)