P.O. Box 1908
1011 Grand Avenue
Glenwood Springs,
CO 81602

ZANCANELLA AND ASSOCIATES, INC.
ENGINEERING CONSULTANTS

(970) 945-5700
(970) 945-1253 Fax

June 14, 2017

Garrett Jackson
Dam Safety Engineer
Division of Water Resources
2754 Compass Drive, Unit 175
Grand Junction, CO 81506

RE: C-2014, LEDE Dam, Request for Conditional Fill with Fill Restriction.

Dear Garrett:

We are submitting a request for a restricted conditional fill approval for the LEDE Reservoir and Dam. On a substantial completion site visit with the Town of Gypsum on November 7, 2016, a punch list of items was developed as part of the completion of the inspection.

The punch list items were as follows:

1. An operational hydraulic gate was needed,
2. A high order monument survey and as-built survey of the dam and reservoir basin was needed,
3. The toe drain lines were needed to be cleaned and re-camera inspected,
4. The drift wood on the riprap face needed to be removed,
5. The instruments needed their initial inspection and approved for operation.

All items on the punch list have been completed.

As noted in the attached Initial Fill Report and Monitoring Plan, an additional inclinometer is planned to be drilled on the dam to better monitor the embankment movement. The inclinometer in place will be utilized until the new inclinometer is constructed and approved. The new inclinometer is anticipated to be drilled and put into service by July 5, 2017.

We request to fill the reservoir half full vertically under a restricted conditional fill order until the required paperwork and as-built information has been submitted as outlined in Rule 10 of the State of Colorado Rules and Regulations for Dam Safety and Dam Construction and approved.

Included with this request are the following documents:

- Project Completion Certification Letter.
- The Initial Fill and Monitoring Plan for L.E.D.E Dam/Reservoir Enlargement Project.
- The Emergency Action Plan and Inundation Mapping for the L.E.D.E. Dam.

The remaining items outlined in Rule 10 of the State of Colorado Rules and Regulations for the Dam Safety and Dam Construction are anticipated to be submitted for final approval around September 1, 2017, but no later than Dec 31, 2017.

If you have any questions, please feel free to contact us.

Very truly yours,

Zancanella & Associates, Inc.

Matthew V. Weisbrod, P.E.

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1011 Grand Avenue
Glenwood Springs,
CO 81602

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Garrett Jackson
Dam Safety Engineer
Division of Water Resources
2754 Compass Drive, Unit 175
Grand Junction, CO 81506

RE: C-2014, LEDE Dam, Certification of Completion

Dear Garrett:

I hereby certify that the L.E.D.E Dam was constructed in conformance with the approved plans, specifications and approved change orders, however due to concerns over the long-term monitoring of the dam, a new inclinometer is being installed on the dam. This new inclinometer is anticipated to be installed around July 5, 2017.

If there is anything else in the meantime, please let us know,

Very truly yours,

Zancanella & Associates, Inc.

Matthew V. Weisbrod, P.E.

L.E.D.E. DAM/RESERVOIR ENLARGEMENT

DAMID 370105

EAGLE COUNTY, COLORADO

INITIAL FILL

AND MONITORING PLAN

PREPARED FOR:

TOWN OF GYPSUM

P.O. Box 130, Gypsum, CO 81637

June, 2017

PREPARED BY:

ZANCANELLA & ASSOCIATES, INC.

1011 Grand Avenue, Glenwood Springs, CO 81601

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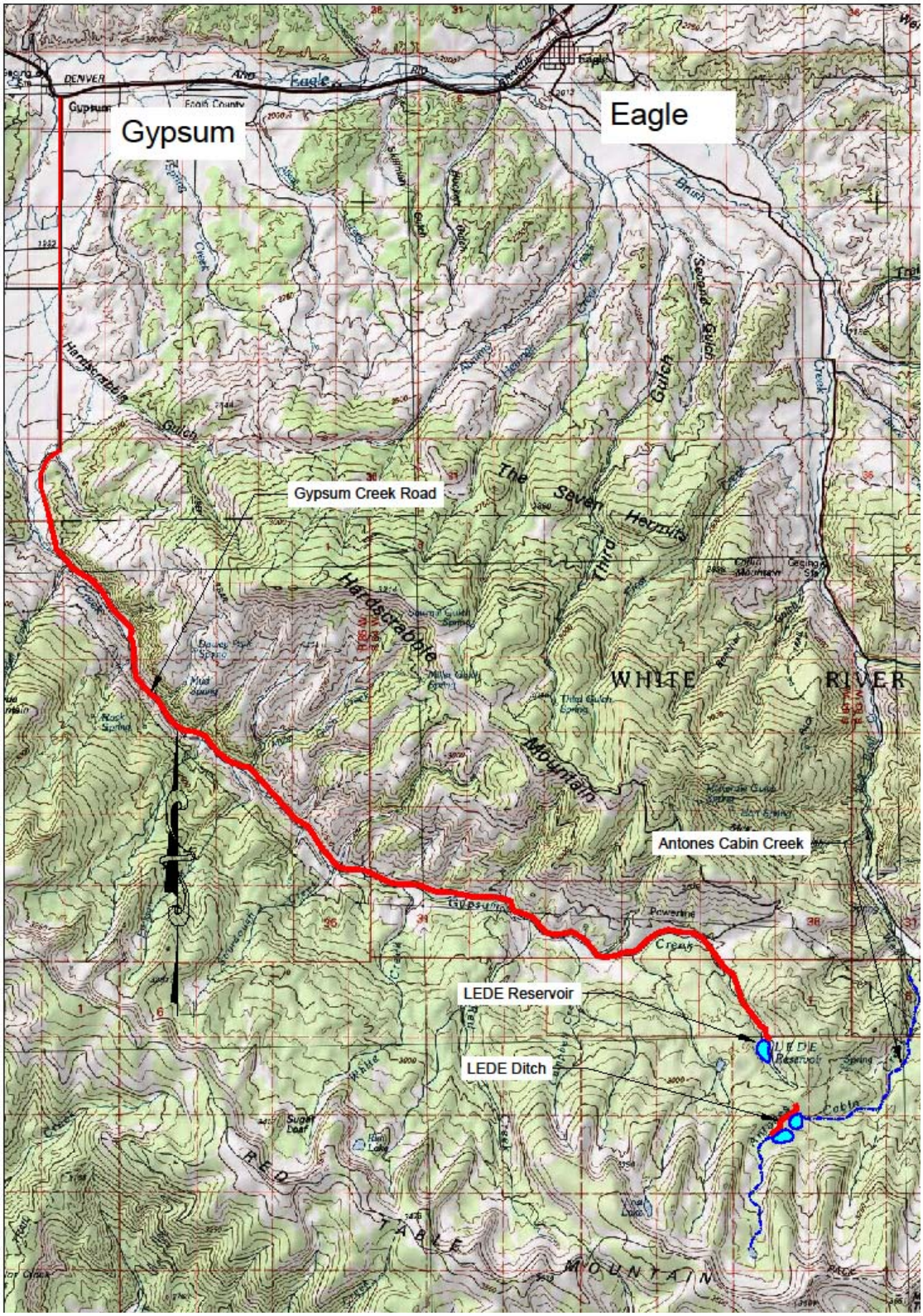
1.0 INTRODUCTION

1.1 Purpose of the Report

This report outlines the monitoring and filling requirements for the first fill of the L.E.D.E. reservoir. It is anticipated that the filling operations will begin in the Spring of 2017. It is anticipated that with the combination of in-basin snow melt runoff as well as the water diverted to the Reservoir from Antone's Cabin Creek, there will be enough inflow to fill the reservoir to the restricted level in one season. The location of the instrumentation and the monumentation is summarized in Section 2.0 of this report for quick reference. A Vicinity Map is provided in Figure 1.1.

Figure 1.1 – Vicinity Map



1.2 Filling Summary

There are two phases of the initial monitoring and filling of the dam. The first phase of the initial filling is the time period after the project gets initial approval to conditionally fill the reservoir under a restricted fill order. It is anticipated that this will occur during the 2017 runoff and will consist of closing the gate on the outlet structure and allowing in-basin and diverted flows to be stored behind the dam.

All the punch list items that were required to be completed prior to the condition fill approval have been satisfied. These included a fully operational gate for the 18" discharge pipe, a baseline measurement of the inclinometer and the piezometers, an initial high order survey of the survey movement monuments along the dam crest, a survey of the dam including a high order survey of the instruments and the complete inspection of the toe drain and chimney filter drain pipes.

During this first phase, the reservoir will be filled half way in vertical elevation to an elevation of 9518 and will be required to follow the requirements outlined in Section 3.0. During the time of filling, the monitoring schedule during filling will be implemented and followed until the filling of the reservoir has reached elevation 9518, see Table 3.2. After this elevation has been reached, no addition height in water will be allowed and the monitoring will be reduced to the Non-Filling monitoring as outlined in Table 3.2. The water level will be required to be maintained at or below the said elevation until the fill restriction has been lifted from the LEDE Reservoir by the SEO.

Once water has been stored, releases from the reservoir will be required to satisfy downstream water rights. The outlet gate will be adjusted to regulate the flow out of the reservoir to maintain the water level as much as practical. Since the reservoir will not substantially replenish released water over the fall and winter, the reservoir level will be checked the following spring, prior to spring runoff, to determine the instantaneous storage level. This will be used to determine the amount of water that can be stored during this runoff season. The same procedures will be followed and the same requirements and storage restrictions will be required until Phase Two of filling is approved.

Phase Two will take place after the final construction completion report has been approved, all the punch list items satisfied, and a request for full storage is approved.

As outlined in the stage storage table in Section 3.0, the reservoir has the potential to fill completely within one season. After the reservoir has reached its maximum storage, the gate will be adjusted to release the excess in-flow. An inspection of the reservoir will be scheduled as outlined in Rules and Regulations for the Dam Safety and Dam Construction at this time as well.

During the Phase Two filling, the monitoring plan for "during filling periods" will be followed as outlined in Table 3.2. The requirements outlined in Section 3.0 will also be required during this filling period. The initial dam filling will be deemed complete when all appropriate documents have been completed and submitted and the State Engineer's Office approves completion of the project. After the approval of completion and the fill restriction is lifted, the monitoring requirements in Table 3.2 for times "not during filling" will be followed.

Below is a brief project summary, a brief description of the dam design, discussion of the instrumentation, discussion on the requirements during the initial filling of the reservoir, and additional discussion on the outstanding punch list items.

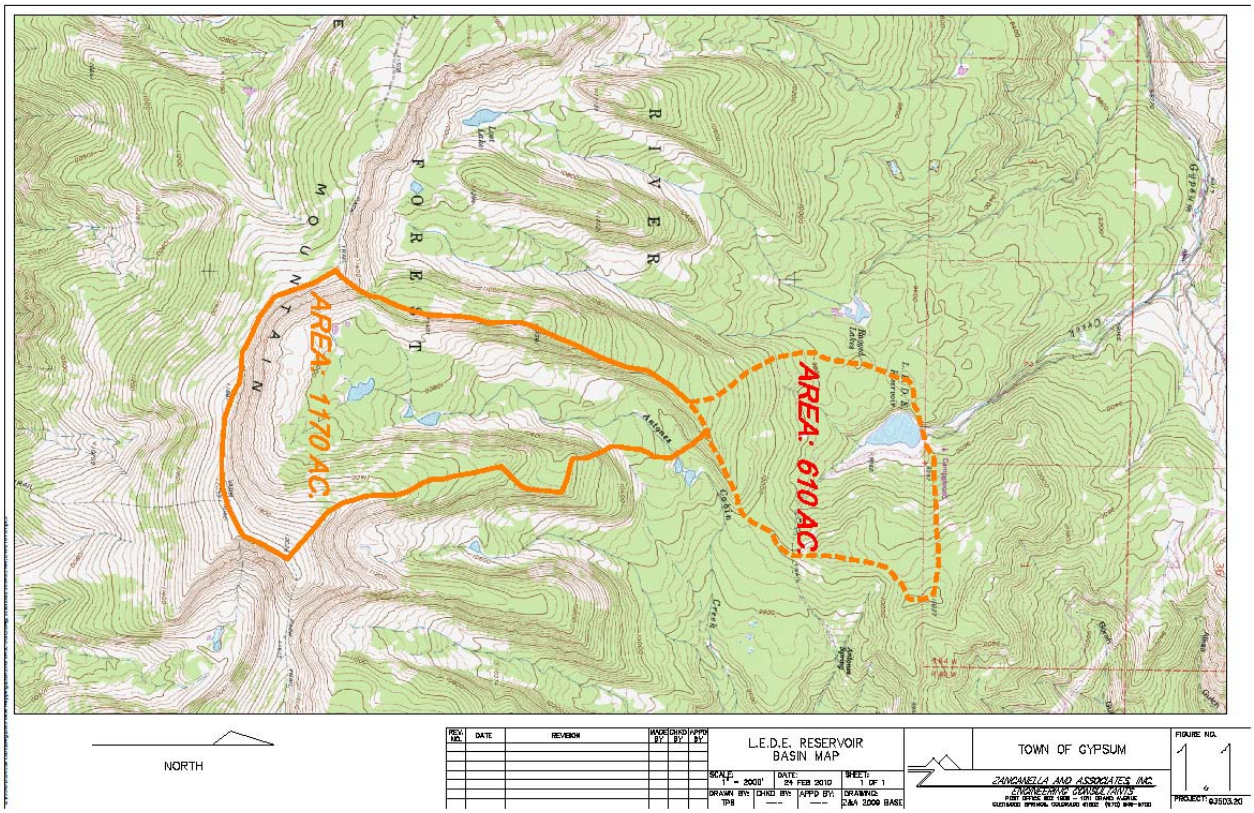
1.3 Project Summary

LEDE Reservoir is located in the Gypsum Creek drainage in Eagle County, Colorado; approximately 17 miles south-southeast of the Town of Gypsum. See Figure 1.2 (The center of the existing dam has a latitude of 39.467° N and a longitude of 106.778° W, which is also approximately 850 feet west of the SE corner of Section 2, T7S, R84W, 6th P.M.) In addition to the water from the Gypsum Creek drainage above the dam, water is diverted into the basin via a ditch approximately 3000 feet long, the LEDE Ditch, from Antones Cabin Creek.

The design reservoir capacity is 947 acre-feet. The capacity will be revised once as built information has been reviewed and calculated. Aerial topography for the reservoir has been completed and is currently being processed. At capacity, the reservoir has a surface area of approximately 32 acres.

The contributing basins and general area are shown in Figure 1.2, LEDE Reservoir Drainage Area.

Figure 1.2 - L.E.D.E. Reservoir Drainage Basins



1.4 Dam Design Summary:

The enlarged dam has a dam crest elevation of 9548.0 feet. The normal high water surface elevation of the enlarged reservoir will be at 9542.0 feet, resulting in a normal freeboard height of six feet. The dam has a standard outlet and an emergency spillway. The proposed alignments of the outlet and the emergency spillway are shown in the Project Drawings.

The existing dam at the site was completely removed as part of the enlarged dam construction. During construction, approximately 50,000 CY of unsuitable material was found and removed from the foundation area. This material was replaced with Qc1, glacial till material from the hillside borrow area meeting the LEDE Dam Specifications for the project.

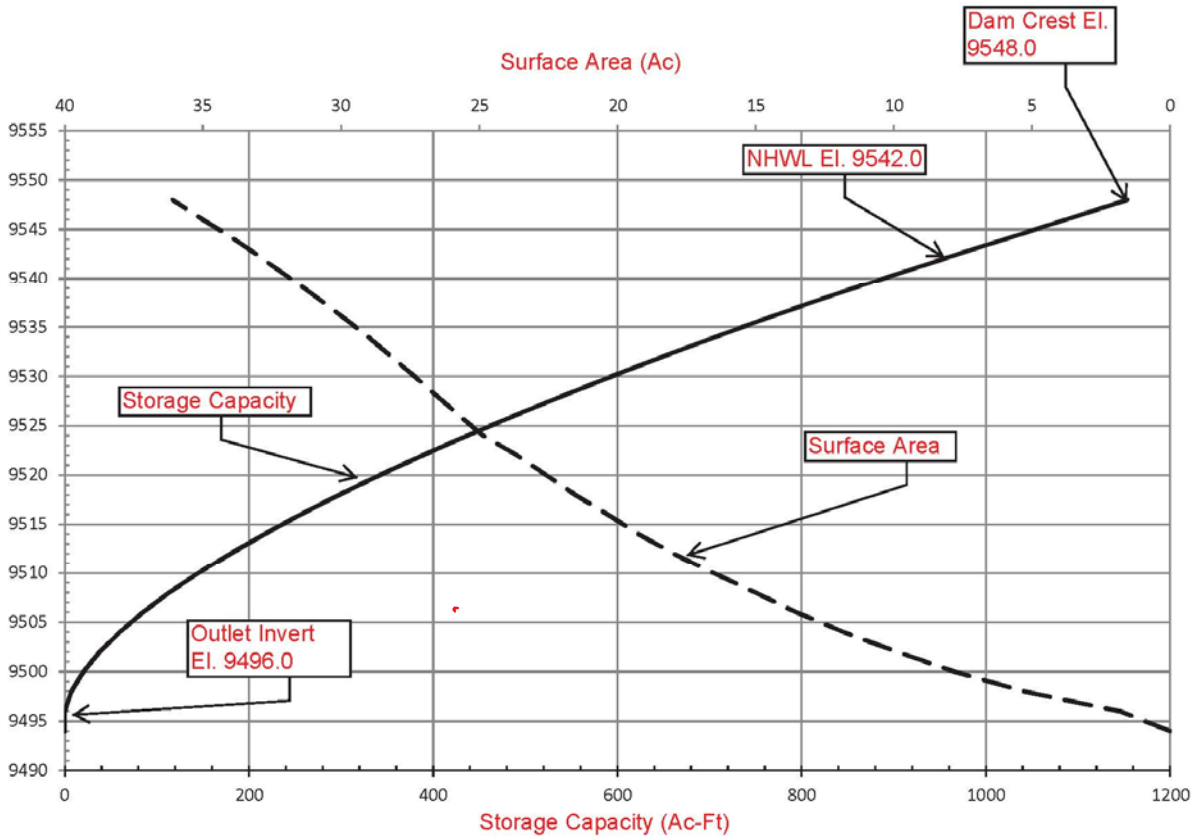
The new dam embankment is a zoned earthfill structure, with an outer shell of glacial till material and an inner core of lower permeability clayey material. The nominal crest elevation of the dam is at 9548 feet, with a crest width of 22 feet. The design upstream slope of the dam is 3.5H:1V and the downstream slope is 2.5H:1V. A vertical sand chimney filter was installed along the downstream boundary of the clay core zone. A blanket drain was placed under approximately two thirds of the downstream embankment. Toe drains were installed along both downstream dam abutments. Fill material for the dam came from local on-site borrow sources. Refer to the Final Dam Report for a detailed description of the geotechnical design of the dam and sources of material

The installed outlet is an 18-inch-diameter pipe with an invert elevation in the reservoir at about 9495 feet, with a trash rack and guard gate at the inlet. The outlet pipe terminates at an energy dissipater at the downstream toe of the dam.

The LEDE Pipeline can add to the reservoir inflow. The Town of Gypsum controls the diversions into the reservoir. If unrestricted, diversions through the LEDE Pipeline could be up to approximately 30 cfs.

The area-capacity data for the reservoir was generated using the average end area method from two-foot contour data in the AutoCAD drawings used for design. The final storage capacity of the reservoir will depend on the volume of material that was excavated from within the reservoir area. The project plans called for the removal of material from within the reservoir to use in construction of the dam. The storage capacity data presented in this report is based on the excavation contours shown on the Construction Plans. The final stage storage table will be developed as part of the As Built drawings and Final Construction Report. See Figure 1.3 for the design Stage-Storage Capacity Curve

Figure 1.3 - Reservoir Area Capacity Curve



1.5 Emergency Spillway Design Summary:

As described in the Hydrology Report prepared in support of the reservoir enlargement project, LEDE Reservoir has a relatively small tributary drainage basin of slightly less than one square mile. The peak spillway discharge during the design storm event was determined to be 800 cfs (EPAT analysis) at the maximum water surface elevation of 9545.3 feet. However, the spillway was also sized to allow the passage of the HMR49 derived peak flow of 1450 cfs with a lesser freeboard at an elevation of 9546.5 feet. Since the outlet works is somewhat oversized, and considering the fact that the inflow from the LEDE Pipeline can be controlled, it is anticipated that the emergency spillway will rarely be required to discharge any water from the reservoir.

2.0 INSTRUMENTATION

2.1 As Built Instrumentation:

In accordance with Rule 5 of the Rules and Regulations for the Dam Safety and Dam Construction for a high hazard dams, the following dam safety instrumentation was installed in the dam to monitor its performance and verify design assumptions:

1. One reservoir staff gage mounted on the outlet works control and air vent concrete encasement.

2. Three toe drain measurement weir locations.

3. One chimney filter drain measurement weir location.

4. Eight embankment movement/settlement monuments.

5. Three survey control monuments in concrete structures.

6. Five piezometer locations.

7. One inclinometer location.

8. Station Markers located every 100 feet along the crest.

The as built will drawings identify each of the above-mentioned instruments, including the location and elevation for each.

See section 4.0 on additional discussion on the inclinometer.

In addition to the listed instrumentation that were installed per Rule 5, a satellite uplink and remote monitoring system has been installed which includes a data logger. Currently the reservoir level and the flow in the outlet flume are being recorded and transmitted every hour and will be monitored at the reservoir throughout initial filling and long term.

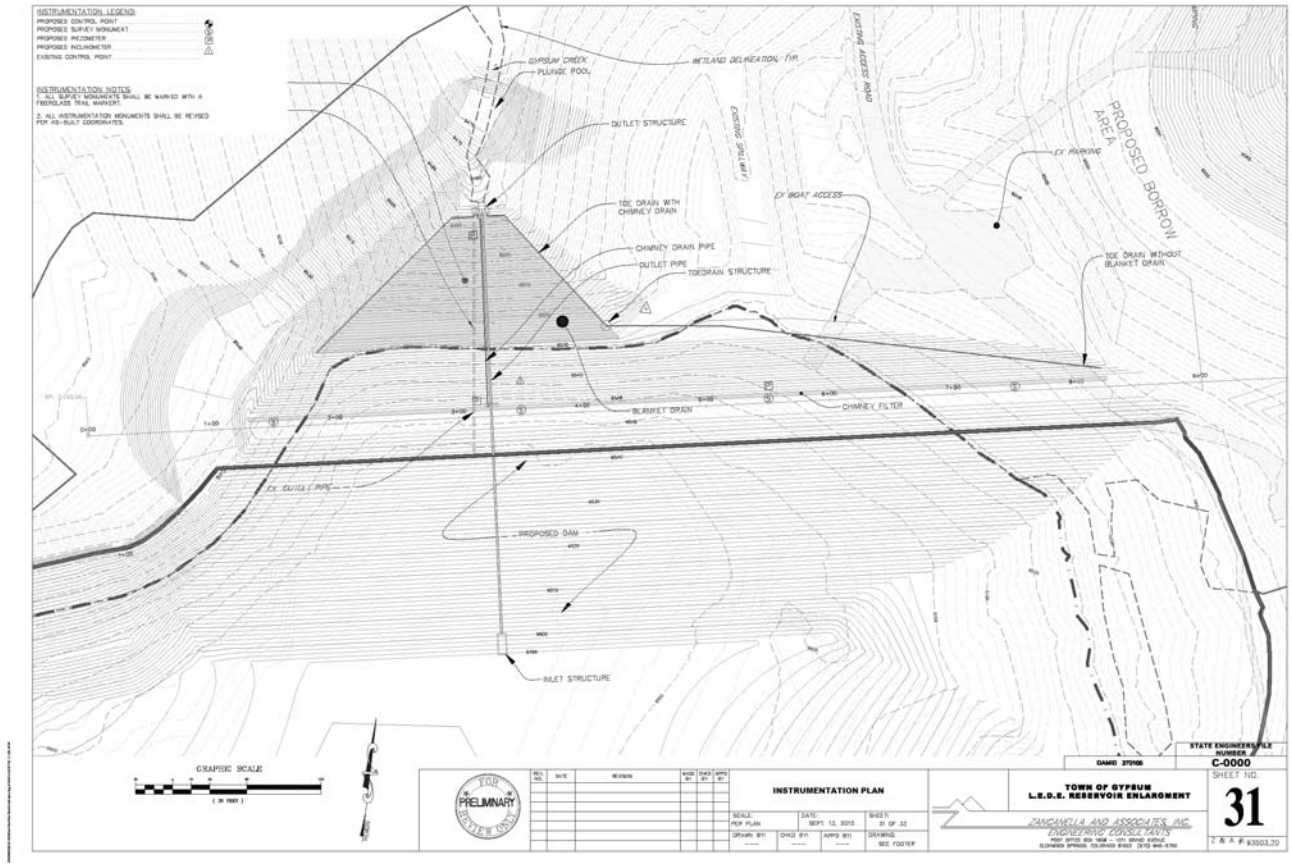
2.2 As-Built Monument and Instrument Locations

The location of the design instrumentation points are included in Figure 2.1. The general location of the as built monuments and instruments are as follows:

1. The reservoir staff gage is generally located at Station 3+25, perpendicular to the dam crest and installed on the upstream side of the dam face.
2. Toe drain staff gages are located at three locations, one inside the monitoring manhole and two at the outlet structure.
3. The chimney filter staff gage is located in the outlet structure.
4. The movement and embankment monitoring points are located on the upstream crest of the dam at 200 foot intervals starting at Station 1+50 and continuing to Station 9+50. There are three more movement monuments located on the dam. These are located on the concrete structures, one on the top most part of the inlet structure, one on the hydraulic control vault at the crest, and one on the top most part of the outlet structure.
5. Two of the survey control monuments are located on the eastern side of the project just to the east of the dam access road. The third monument location is at the western side of the project, just to the west of the emergency spillway. One east and the west monument are located on the centerline of the dam with the third be off-set.
6. There are four piezometers located along the crest of the dam. They are generally located at Stations, 2+25, 2+75, 3+25, and 5+50. There is one piezometer located near the toe of the dam, roughly 30 feet up from the outlet structure at Station 3+25.
7. There is an inclinometer generally located at Station 3+50 and roughly 30 feet down from the downstream dam crest.

8. There are station markers located on the downstream side of the crest of the dam beginning at station 2+00 and going to 9+00.

Figure 2.1 – Design Plan Set Instrumentation Plan



See the Dam Construction Plan Set and the as built Plan Set for the full sized version of the Instrument Plan. This sheet will be revised with the as-built locations of all the monuments and instruments and will be included in the final dam completion report.

3.0 INITIAL FILL REQUIREMENTS

3.1 Initial Requirements.

The L.E.D.E Dam is a High Hazard, Large, Dam and requires proper oversight and filling to ensure the long term safety of the dam and the downstream property owners. The fill rate for the Reservoir for the initial fill shall be **no more than one-foot rise per day**. The inflow into the reservoir and the outflow releases from the reservoir shall be controlled to achieve this requirement during the initial fill phase. Table 3.1 outlines the maximum net flow into the reservoir to meet the one foot per day requirement.

Table 3.1 - Elevation-Storage-Max Fill Requirement

Elevation (ft)	Storage (ac-ft)	Incremental Storage (ac-ft)	Max Fill Rate to Achieve Incremental Volume = 1 ft Stage Increase (cfs)	Days
9494	0.1	0.1	0.1	1
9495	0.2	0.1	0.1	2
9496	0.3	0.1	1.7	3
9497	3.6	3.3	1.8	4
9498	7.1	3.5	3.3	5
9499	13.7	6.6	3.3	6
9500	20.2	6.5	4.4	7
9501	29	8.8	4.5	8
9502	37.9	8.9	5.5	9
9503	48.7	10.8	5.5	10
9504	59.5	10.8	6.4	11
9505	72.2	12.7	6.4	12
9506	84.9	12.7	7.2	13
9507	99.1	14.2	7.2	14
9508	113.4	14.3	7.9	15
9509	129.1	15.7	8.0	16
9510	144.9	15.8	8.7	17
9511	162.1	17.2	8.7	18
9512	179.4	17.3	9.4	19
9513	198	18.6	9.3	20
9514	216.5	18.5	10.0	21
9515	236.3	19.8	10.0	22
9516	256.1	19.8	10.6	23
9517	277.1	21	10.6	24
9518	298	20.9	11.1 – Restricted Fill Level	25
9519	320	22	11.2	26
9520	342.1	22.1	9.0	27
9521	360	17.9	14.3	28
9522	388.3	28.3	12.3	29
9523	412.6	24.3	12.2	30
9524	436.8	24.2	12.8	31
9525	462.1	25.3	12.8	32
9526	487.4	25.3	13.2	33
9527	513.5	26.1	13.2	34
9528	539.6	26.1	13.6	35
9529	566.5	26.9	13.6	36
9530	593.5	27	14.0	37
9531	621.2	27.7	14.0	38
9532	649	27.8	14.4	39
9533	677.6	28.6	14.4	40
9534	706.2	28.6	14.9	41
9535	735.7	29.5	14.8	42

9536	765.1	29.4	15.4	43
9537	795.5	30.4	15.4	44
9538	825.9	30.4	15.9	45
9539	857.3	31.4	15.8	46
9540	888.6	31.3	16.4	47
9541	921	32.4	16.3	48
9542	953.3	32.3	16.8 – Spillway Crest	49
9543	986.6	33.3	No Fill	50
9544	1020	33.4	No Fill	51
9545	1053.3	33.3	No Fill	52
9546	1086.7	33.4	No Fill	53
9547	1120	33.3	No Fill	54

The outlet structure has a maximum capacity of 40 cfs. Due to the delayed flows from the Antones Cabin Creek diversion into the reservoir, the outlet pipe shall be utilized to control the reservoir levels by operating the outlet head gates and increasing or decreasing the releases from the reservoir. The normal operating diversions from Antones Cabin Creek are around 5 cfs but can be increased to 15-20 cfs.

3.2 Monitoring Schedule

The monitoring plan during the initial fill of the reservoir for the dam safety instrumentation and dam performance is summarized in Table 3.2. The monitoring frequency may be modified with the concurrence of the Dam Safety Engineer's office based on the actual performance of the dam during the initial fill. After this initial monitoring, long term monitoring shall be per Rule 15 of the Rules and Regulations for the Dam Safety and Dam Construction for a high hazard dam.

Table 3.2 Recommended Initial Fill Monitoring Schedule

Instrumentation	**During Filling Periods***	**During Non-Filling and Post Filling Schedule***
Reservoir Staff Gage	Weekly	2x Month
Dam Seepage Inspection	Weekly	2x Month
Drain System Measurement Locations	Weekly	2x Month
General Dam Inspection	Weekly	2x Month
Embankment Movement Inspection	Weekly	Annually for first five years
Embankment Survey Monuments	Annually	Annually for first five years

*During operation season of approximately June 1 through October 15. Reservoir is inaccessible at other times.

Since the total initial filling of the reservoir will be over more than one season due to the two phased approach to filling, the monitoring of the reservoir's initial filling will continue over multiple seasons either utilizing "During Filling" or "During Non-Filling" requirements. This will be based on when the reservoir is filling or not in the Phase 1 or Phase 2 of the filling process until the final acceptance of the reservoir and dam has been approved.

During the time when access is limited to the dam, the inspections shall continue but with a reduced frequency of once per month or as the access to the site allows. In addition, no filling will be done during these times by either adjusting the dam outlet gate or reverting to the requirements outlined in Table 3.2. The results of the limited access inspections will be submitted to the SEO's office.

After initial filling, reporting requirements shall coincide with the monitoring schedule outlined in the Table 3.2 "Post Filling Schedule". The monitoring results shall be recorded and submitted to the SEO's office upon completing of filling for each season, unless dam performance dictates otherwise.

4.0 ADDITIONAL ITEMS

4.1 Inclinometer:

During the initial reading of the inclinometer, it was found that the inclinometer was installed with a deviation from vertical of around 4.5%. Due to this, the determination was made to install an additional inclinometer on the west side of the outlet pipe to ensure accurate long term measurements of the potential movement in the dam embankment. The initial inclinometer will be utilized to measure embankment movement until the new inclinometer is installed, at which time the new inclinometer will become the inclinometer of record for embankment movement. It is anticipated that the new inclinometer will be drilled and installed around July 5, 2017. As built information on the new inclinometer will be included in the Dam Completion Report and on the as built drawings.

5.0 REFERENCES

1. Colorado Division of Water Resources, (CO DWR, 2007), *Rules and Regulations for Dam Safety and Dam Construction,* Denver, CO, January 2007.

2. Colorado Division of Water Resources, (CO DWR, 1996), *Dam Safety Project Review Guide,* Denver, CO, May 1996.

3. USDA Soil Conservation Service, (SCS, 1969), *Technical Release No. 46 – Gated Outlet Appurtenances- Earth Dams,* Portland, Oregon, June 1969.

4. USDA Soil Conservation Service, (SCS, 1983), *Technical Release No. 69 – Riprap for Slope Protection Against Wave Action,* February 1983.

5. United States Army Corps of Engineers, (USACE, 1990), *HEC-1, Flood Hydrograph Package,* Davis, CA, September 1990.

6. U.S. Bureau of Reclamation, (USBR 1978), Design of Small Canal Structures, Denver, Colorado, 1978.

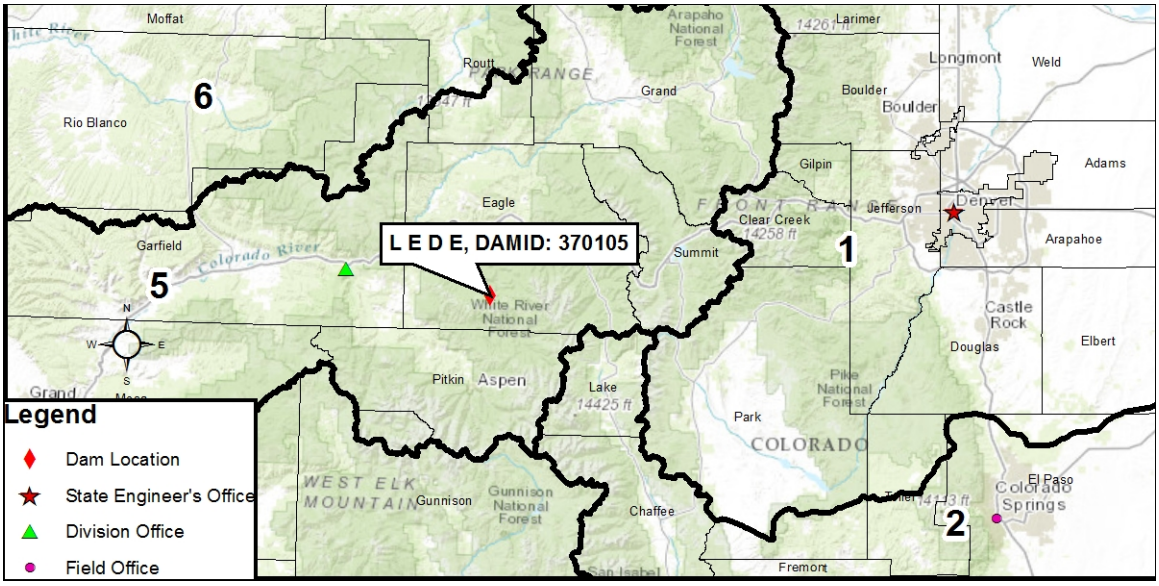
7. Zancanella & Associates, Inc, (Z&A 2012), Design Report, L.E.D.E Dam/Reservoir Enlargement, DAMID 370105, State Eng. File Number C-2014, Town of Gypsum, Colorado, 2012.

EMERGENCY ACTION PLAN (EAP)

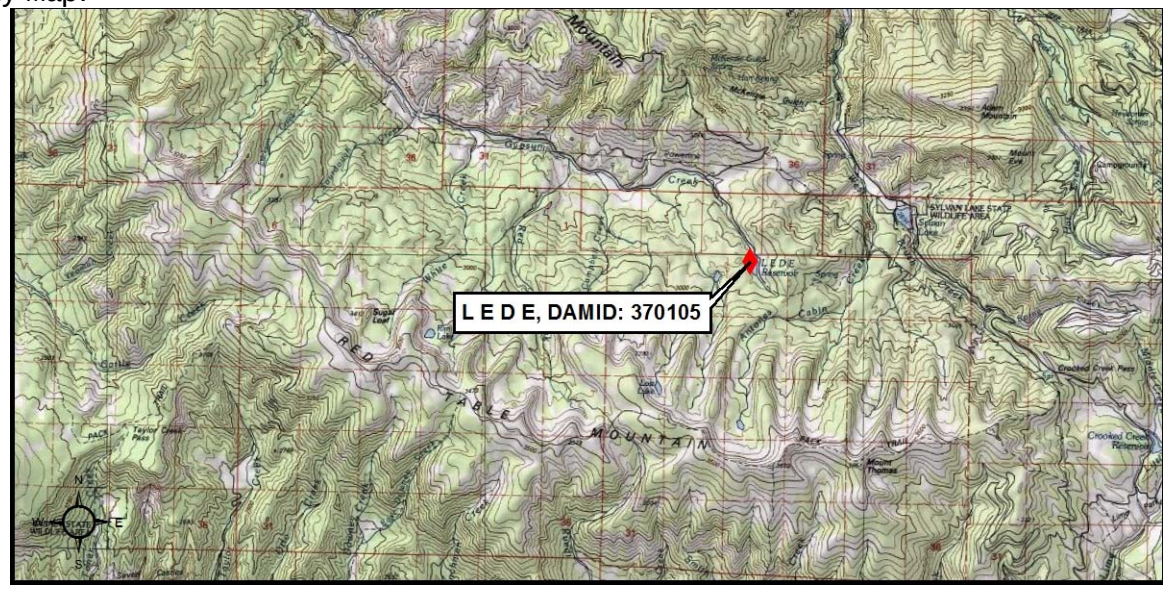
Notifications and Essential Information

L E D E DAM
EAGLE COUNTY, COLORADO
HAZARD CLASSIFICATION: HIGH
State of Colorado DAMID: 370105

Location Map:



Vicinity Map:



EAP Date: February 16, 2017

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ESSENTIAL DAM INFORMATION

Dam Owner

- Primary Contact: JEFF SHROLL
- Organization: TOWN OF GYPSUM
- Address: P O BOX 130, GYPSUM, CO 81637-
- Contact info: 970-945-8522 X 220
- Location of Dam
- County: EAGLE
- Nearest Downstream Town: GYPSUM
- River/Drainage: GYPSUM CREEK
- Coordinates: 39.466669ºN, -106.778891ºW
- Closest Physical Address: 15877 Gypsum Creek Rd

Description of the Dam

Dam Type & Dimensions

- Type of Dam: RE – zoned earth fill
- Dam Height: 57 (feet)
- Crest Length: 825 (feet)
- Crest Width: 22 (feet)

Spillway Characteristics

- Drainage Basin Area: 640 (acres)
- Reservoir Normal Capacity: 957 (acre-feet)
- Emergency Spillway Type: Ungated Open Channel on Earth
- Emergency Spillway Upper Width: 50 (feet)
- Emergency Spillway Lower Width: 30 (feet)
- Spillway Freeboard: 1 (feet)
- Maximum Spillway Capacity: 2031 (cfs), Hyperlink to Spillway Discharge Rating Table
- *Pass 100 year Flood?:* Y or N - yes

Outlet Characteristics

- Size: 18" SDR 17 HDPE
- Maximum Capacity: 42 (cfs), Hyperlink to Outlet Discharge Rating Table

EVENT LEVEL DETERMINATION & EXPECTED ACTIONS

Level Determination

An unusual event or potential emergency situation should be characterized as one of the following:

- High Flow Below Dam – Non-Failure
- Unusual Condition at Dam – Non-Failure
- Potential Dam Failure – Immediate Action Required
- Evacuation Required – Dam Failure in Progress or Unavoidable

This EAP will be activated upon detection of conditions events that are not within the realm of normal operations at the dam.

Expected Actions

The Expected Actions of each responsible party, for each event level are described below:

High Flow Below Dam – Non-Failure	
Dam Owner	Report conditions, monitor, report on reservoir and spillway stage and outlet releases and plan for adjustments to maintain integrity of the dam.
Dam Safety Engineer	Maintain communication with owner for current status and changes, interpret conditions above and below the dam that might impact future flows and dam safety; the value of a site visit to observe conditions first hand should be considered.
Regional Field Manager	Discuss conditions to obtain situational awareness, assess life-safety issues and potential infrastructure impacts, internal notifications within EM community
Local EM	Contact local floodplain managers to assess the flooding impacts based on the releases being made. (Reference Spillway and outlet works discharge rating information)
NWS	Provide forecasts for future impacts to conditions that aid the above entities in planning and preparedness, public notifications as necessary, issue a watch or a warning depending on the level of discharge and flow downstream.
Other	(fill in as necessary)

Unusual Condition at Dam – Non-Failure	
Dam Owner	Report conditions, monitor, assess need for resources to prevent escalation of incident, assess capabilities, engage their engineer.
Dam Safety Engineer	Assess reports of conditions; assist dam owner with direction/actions/assessments to prevent escalation of incident, coordinate with RFM's; the value of a site visit to observe conditions first hand should be considered.
Regional Field Manager	Discuss conditions with DSE to obtain situational awareness, assess life-safety issues and potential infrastructure impacts, internal notifications within EM community.
Local EM	Evaluate conditions relative to their area of authority and or responsibility; assess impacts and resource needs as necessary.
NWS	Provide forecasts, public notifications (watches and warnings) as necessary.
Other	(fill in as necessary)

Potential Dam Failure – Immediate Action Required	
Dam Owner	Report conditions, monitor, assess need for resources to prevent escalation of incident, assess capabilities, engage their engineer.
Dam Safety Engineer	Assess reports of conditions, site visit immediately if possible, assist dam owner with direction/actions/assessments to prevent escalation of incident, coordinate with RFM's, mobilize to EOC if one is activated.
Regional Field Manager	Discuss conditions with DSE to obtain situational awareness, assess life-safety issues and potential infrastructure impacts, internal notifications within EM community, consideration of and preparation for pre-evacuations, assess need for and facilitate with local disaster declarations.
Local EM	Evaluate conditions relative to their area of authority and or responsibility; assess impacts and resource needs as necessary, consideration of and preparation for pre-evacuations.

NWS	Provide forecasts, assist with public notifications, watches would be appropriate at this event level as actions are taken, prepare other public messaging as appropriate.
Other	(fill in as necessary)

Evacuation Required – Dam Failure in Progress or Unavoidable	
Dam Owner	Report reservoir conditions as breach occurs, provide timing and situational awareness of on-site conditions to emergency managers.
Dam Safety Engineer	Assess reports of conditions, site visit if possible, assist dam owner with direction/actions/assessments to prevent escalation of incident, coordinate with RFM's, mobilize to EOC.
Regional Field Manager	Discuss conditions with DSE to obtain situational awareness, assess life-safety issues and potential infrastructure impacts, internal notifications within EM community, assess need for and assist with disaster declarations.
Local EM	Evaluate conditions relative to their area of authority and/or responsibility; activate all available resources as necessary to affect evacuation of inundation zone.
NWS	Provide public notifications for flash flooding along inundated zone and call for immediate evacuation, a flash flood warning will be issued with appropriate other information.
Other	(fill in as necessary)

NOTIFICATIONS and COMMUNICATION

In order for all responsible parties to be able to prepare a response to a given emergency, notification to at least one individual from each of the agencies/entities shown in the table below should be made. Please keep the following in mind:

- These responsible parties should communicate within their appropriate chain of command.
- It is expected that Regional Field Managers (RFM) from CDHSEM will alert affected state infrastructure as necessary (i.e. Colorado Department of Transportation, Colorado State Patrol).
- It is expected that Local Emergency Managers will alert all pertinent emergency service contacts within their jurisdictions (i.e. Sheriff's Office, Fire Departments, etc.)

Emergency Notifications List

Emergency Notifications List				
Agency/Organization	**Contact Name**	**Email Address**	**Cell Phone #**	**Alternate #**
Dam Owner				
Primary	Jim Hancock	Jim@townofgypsum.com	970.914.0034	970.524.1728
Secondary	Jeff Shroll	Jeff@townofgypsum.com	970.471.3326	970. 524.7514
Div. Water Resources				
Dam Safety Engineer	Garrett Jackson	garrett.jackson@state.co.us	970.688.2754	970.945.5665

Emergency Notifications List				
Agency/Organization	**Contact Name**	**Email Address**	**Cell Phone #**	**Alternate #**
Dam Safety Branch Chief	Bill McCormick	bill.mccormick@state.co.us	719.338.6124	719.530.5536
Alternate – Water Commissioner	Bill McEwen	Bill.McEwen@state.co.us	970.328.6850	970.328.6850
CDHSEM				
Primary – RFM	Chuck Vale	chuck.vale@state.co.us	970.846.3912	
Secondary – Duty Officer				303.279.8855
Alternate – Plan Coordinator	Kerry Kimble	Kerry.Kimble@state.co.us		720.852.6604
CDOT – Region 3	Chad Ray	Chad.Ray@state.co.us	719.240.1531	970.683.6284
CO State Patrol – District 4	Barry Bratt	barry.bratt@state.co.us	970.589.6989	970.249.4392
Local Emergency Managers				
County EM	Barry Smith	barry.smith@eaglecounty.us	970.479.2201	970.328.3545
City EM				
Fire Department	Justin Kirkland	justin@gypsumfd.com		970.524.7101 Ext 15
Sheriff's Office	James Van Beek	james.vanbeek@eaglecounty.us		970.328.8500
NWS Regional Office				
Hydrologist	Aldis Strautins	aldis.strautins@noaa.gov	970.243.7007	800.868.7964
Warning Meteorologist	Jim Pringle	james.pringle@noaa.gov	970.243.7007	800.868.7964

Event Communication

The Regional Field Manger (RFM) from CDHSEM will coordinate text message groups and conference calls to facilitate situational awareness, as appropriate throughout the event.

LOCALLY AVAILABLE RESOURCES

The table below should be pre-populated by the dam owner, with consideration to how an emergency situation at the dam may be averted, mitigated, etc. (i.e. what resources would be needed to arrest a given situation and prevent failure of the dam)

- Location/availability of resources should be pre-planned.
- It is recommended that owner call resources before including in list to ensure contact names/resource availability.
- Consideration for an on-call type contract between owner/provider to expedite services should be given.

Locally Available Resources List

Locally Available Resources Table				
Resource Type	**Contact Name**	**Address**	**Primary #**	**Alternate #**
Heavy Equipment Contractor/Rental				
1. Town of Gyspum	Daniel Vigil	P.O. Box 130 Gypsum, CO 81637	970.524.5024	970.524.3127
2. Wagner Rental		3071 Dolores Way Carbondale, CO 81623-2214	970.340.5038	
Sand & Gravel Supply				
1. United Companies		11589 Hwy 6 Gypsum, CO 81637	970.243.5994	
2. Casey Concrete		4155 Hwy 6, US-6, Gypsum, CO 81637	970.524.2520	
Ready Mix Concrete Supply				
1. United Companies		11589 Hwy 6 Gypsum, CO 81637	970.243.5994	
2. Casey Concrete		4155 Hwy 6, US-6, Gypsum, CO 81637	970.524.2520	
Pumps				
1. Rain for Rent		100 Oil Court Rifle, CO 81650	970.625.2407	
2. Business Name				
Diving Contractor				
1. Beaver Divers		41199 US Hwy 6 & 24 Eagle-Vail, CO 81620	970.949.1012	
2. D & R Commercial		1204 N 7th St #110, Grand Junction, CO 81501	970.640.1896	
Sand Bags/Plastic Sheeting				
1. Wylaco Supply Company		780 Hwy 6 Gypsum, CO 81637	970.524.6484	800.441.1785
2. Roaring Fork Co-Op		760 CO-133, Carbondale, CO 81623	970-963.2220	

EVACUATION INFORMATION

Critical Infrastructure List

From examination and study of the inundation maps and consultation with local entities, a listing of critical infrastructure should be developed to aide an efficient emergency response. Structures described in the critical infrastructure list should include; population centers, roadways, schools, hospitals, police and fire stations, and utilities (water, sewer, gas, electric providers).

This list should be developed in conjunction with your engineer, regional field manager and local emergency managers.

Critical Infrastructure List		
Critical Infrastructure Structure	**Distance From Dam (miles)**	**Flood Arrival Time (hrs)**
Intersection of FS Road 412 and 413	1.3	0.167
T.O.G Little G Water Intake	13.14	1.167
Draggett Ln Bridge	17.37	1.6
Cotton Wood Pass Rd Bridge	17.97	1.7
Cotton Ranch Dr Bridge	20.03	1.87
Vickburg Ln Bridge	20.95	1.97
Hwy 6 Bridge	21.90	2.13
Price Lane Bridge	22.90	2.32
Riverdance RV Park	26.10	3.10

Inundation Maps

Inundation maps will be provided to show the limits of the dam failure flooding. All inhabited structures within the identified flood limits must be evacuated to a safe zone well outside those limits. **See Appendix A for the inundation maps defining those inundation and evacuation limits**.

Spillway Discharge Rating Tables/Curves

Spillway discharge rating curves should be provided for the high-flow conditions event level case. All cases should be checked by initiating communication with the local flood plain manager to determine the severity of impacts for the full range of spillway discharges. It should be noted that dangerous spillway flows can be occurring while the dam is operating safely. **See Appendix B for the spillway discharge curves and tables.**

Outlet Works Discharge Rating Tables/Curves

In some cases the dam owner may desire to make outlet works releases. In some of those cases the outlet release capacity may exceed the safe channel capacity below the dam. All cases should be checked by initiating communication with the local flood plain manager to determine the severity of impacts for the full range of outlet release capabilities at the given dam. It should be noted that dangerous outlet works release flows can be occurring downstream while the dam is operating safely **Appendix C contains the outlet works rating tables and curves.**

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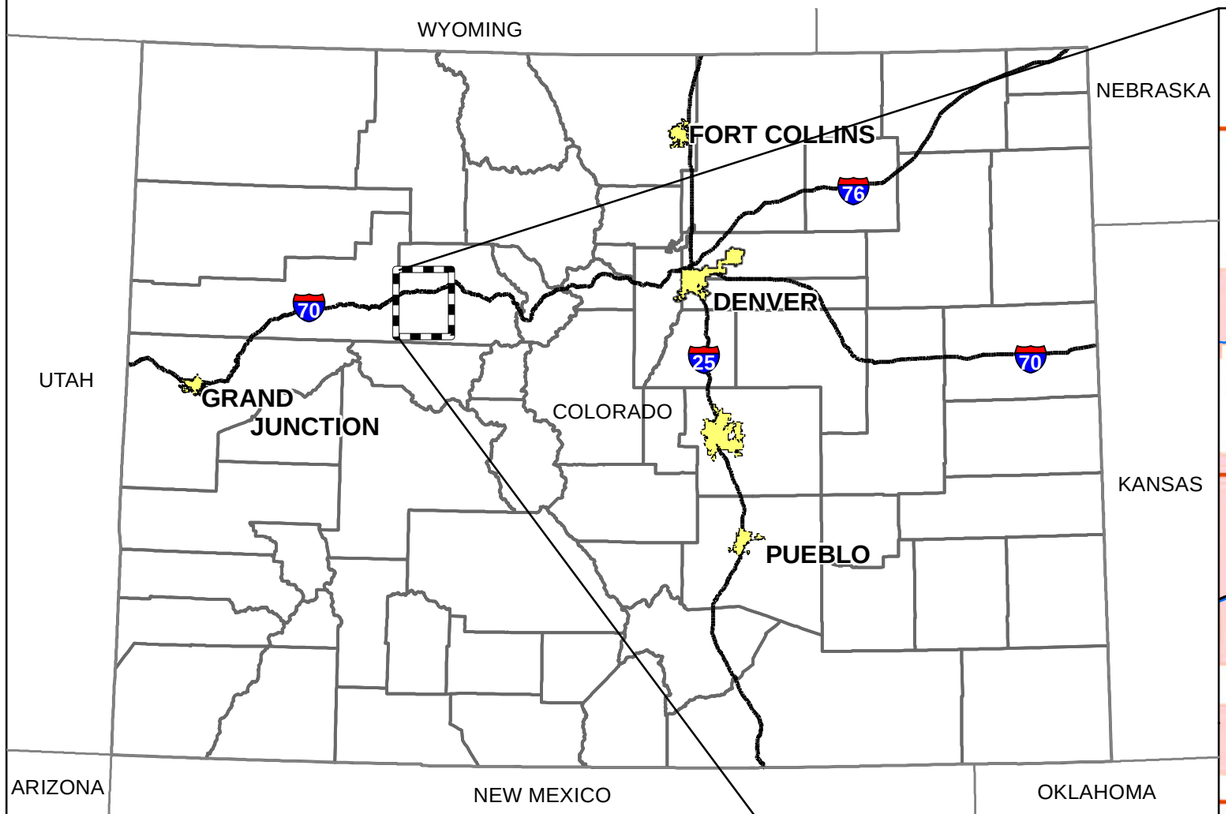

L.E.D.E. Reservoir Enlargement

Emergency Action Plan

Dam Failure Flood Inundation Map Index

P.O. Box 1908
1011 Grand Avenue
Glenwood Springs,
CO 81602

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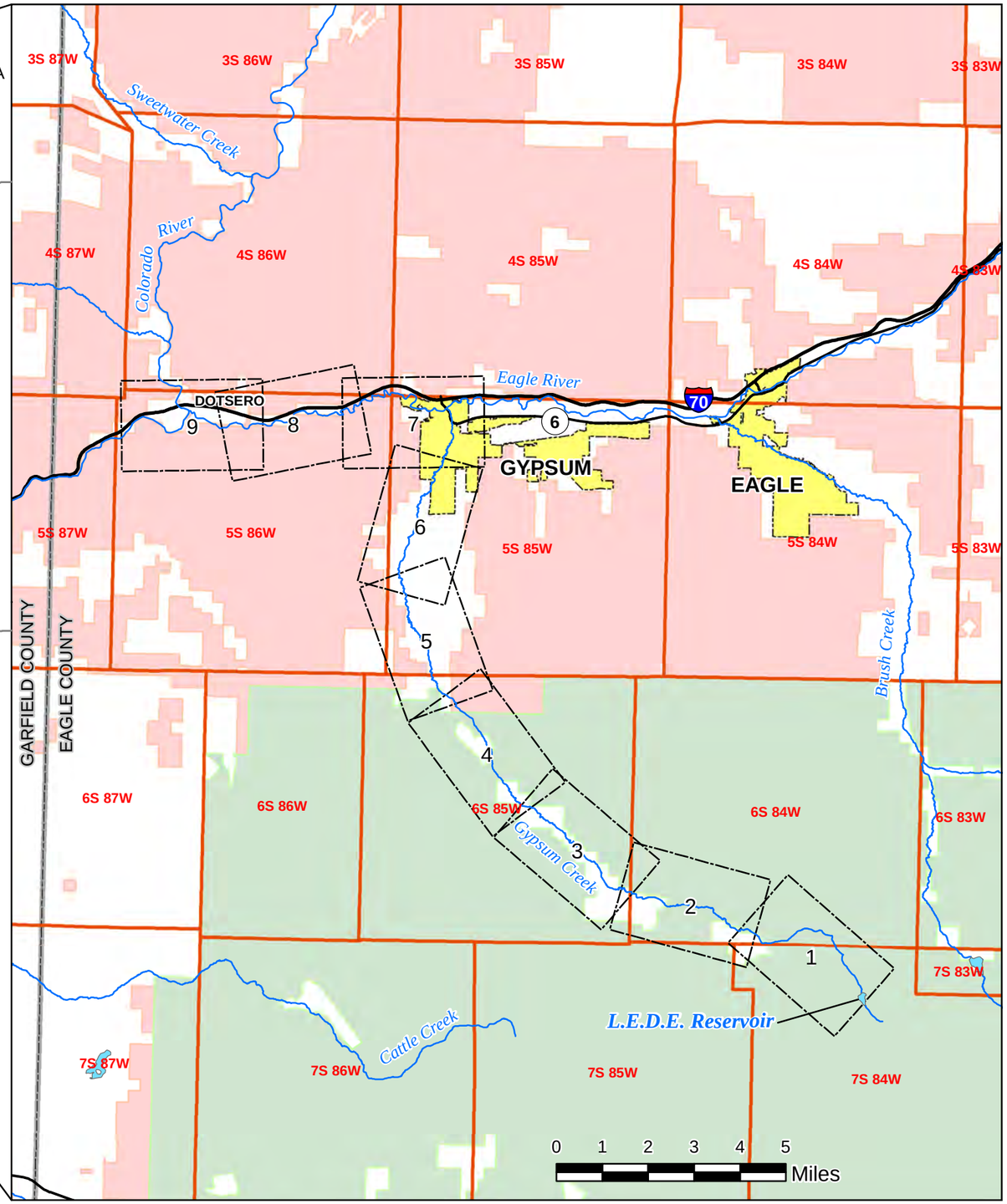
ENGINEERING CONSULTANTS

(970) 945-5700
(970) 945-1253 Fax

Job. No. 93503.20
January 2017



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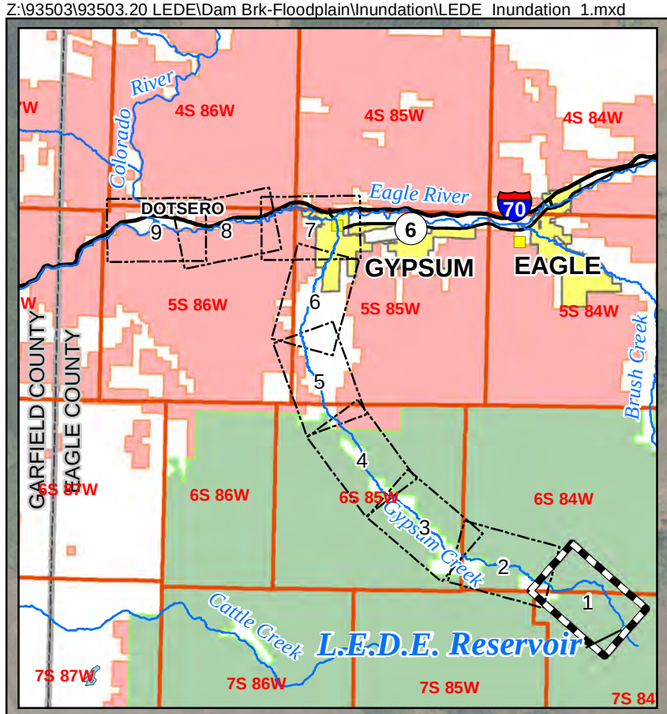

MATCHLINE

Map Sheet 1

Map Sheet 2

Gypsum Creek 1st Downstream Structure

3.5 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 33,322
Maximum Water Surface Elevation (ft) = 8,521
Maximum Stage (ft) = 15
Flood Wave Arrival Time (hr:min) = 0:21
Time to Peak Flood Stage (hr:min) = 0:28

Downstream of L.E.D.E. Dam Embankment

0.0 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 34,577
Maximum Water Surface Elevation (ft) = 9,498
Maximum Stage (ft) = 19
Flood Wave Arrival Time (hr:min) = 0:00
Time to Peak Flood Stage (hr:min) = 0:16

0 1,000 2,000 Feet

N E S W

L.E.D.E Reservoir Enlargemment
Dam Failure Inundation Map

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MAP SHEET: 1

PROJECT: 93503.20

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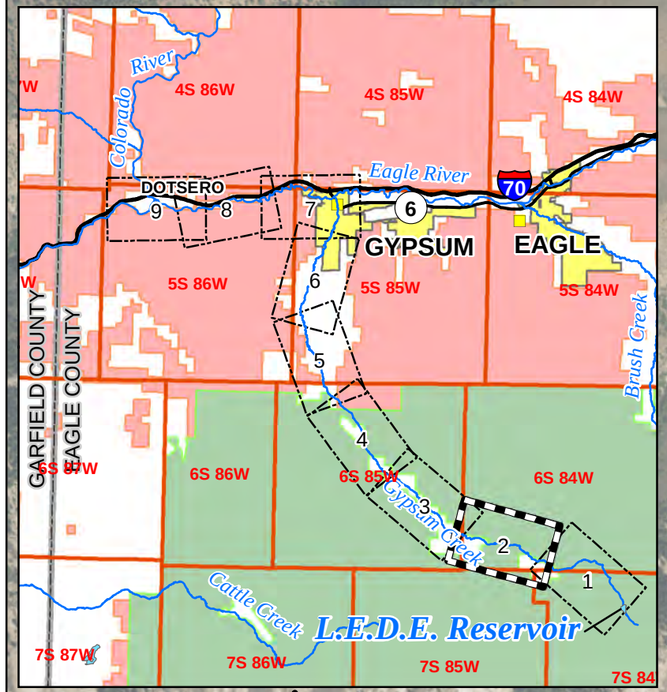

0 1,000 2,000 Feet

N E S W

Gypsum Creek 2nd Downstream Structure
5.62 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 32,024
Maximum Water Surface Elevation (ft) = 8,103
Maximum Stage (ft) = 22
Flood Wave Arrival Time (hr:min) = 0:30
Time to Peak Flood Stage (hr:min) = 0:36

Gypsum Creek 1st Downstream Structure
3.5 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 33,322
Maximum Water Surface Elevation (ft) = 8,521
Maximum Stage (ft) = 15
Flood Wave Arrival Time (hr:min) = 0:21
Time to Peak Flood Stage (hr:min) = 0:28

Gypsum Creek 3rd Downstream Structure
6.20 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 31,852
Maximum Water Surface Elevation (ft) = 8,034
Maximum Stage (ft) = 13
Flood Wave Arrival Time (hr:min) = 0:33
Time to Peak Flood Stage (hr:min) = 0:38

Map Sheet 3
Map Sheet 2
Map Sheet 1
MATCHLINE
MATCHLINE

L.E.D.E Reservoir Enlargemment
Dam Failure Inundation Map

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MAP SHEET: 2

PROJECT: 93503.20

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0 1,000 2,000 Feet

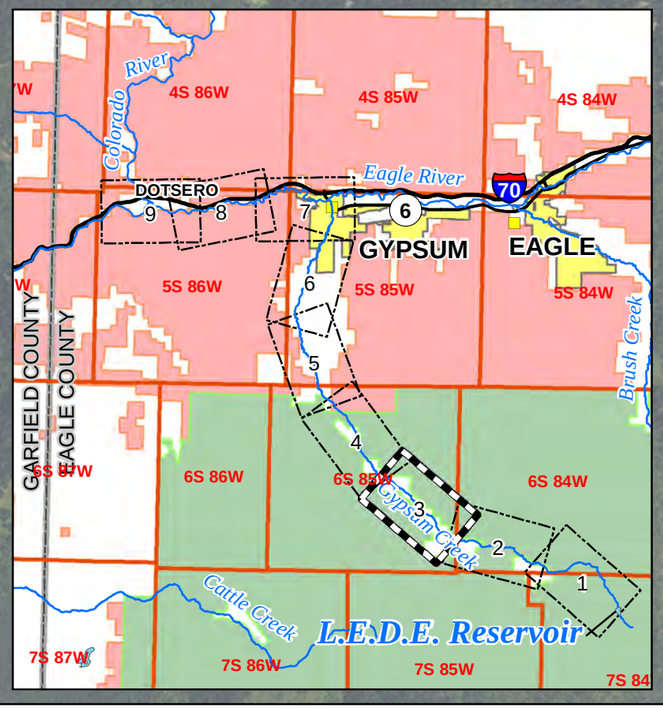
N

Gypsum Creek Downstream Structure
9.59 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 24,011
Maximum Water Surface Elevation (ft) = 7,743
Maximum Stage (ft) = 14
Flood Wave Arrival Time (hr:min) = 0:55
Time to Peak Flood Stage (hr:min) = 1:01

Gypsum Creek Downstream Structure
8.74 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 24,547
Maximum Water Surface Elevation (ft) = 7,793
Maximum Stage (ft) = 16
Flood Wave Arrival Time (hr:min) = 0:49
Time to Peak Flood Stage (hr:min) = 0:57

Gypsum Creek Downstream Structure
7.95 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 26,849
Maximum Water Surface Elevation (ft) = 7,860
Maximum Stage (ft) = 19
Flood Wave Arrival Time (hr:min) = 0:44
Time to Peak Flood Stage (hr:min) = 0:51

Map Sheet 4
Map Sheet 3
MATCHLINE
MATCHLINE
Map Sheet 2
Map Sheet 3



L.E.D.E Reservoir Enlargemment
Dam Failure Inundation Map

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MAP SHEET: 3

PROJECT: 93503.20

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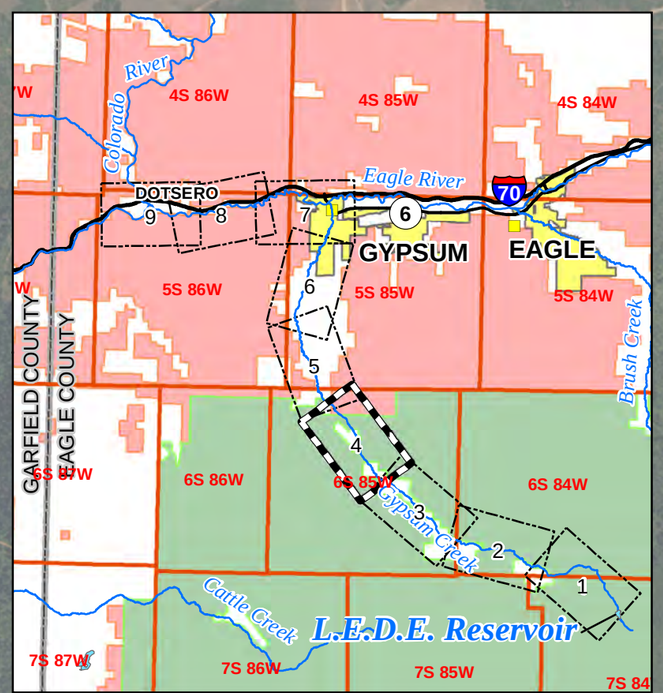
0 1,000 2,000 Feet

Gypsum Creek Little G Water Intake
13.14 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 23,174
Maximum Water Surface Elevation (ft) = 7,044
Maximum Stage (ft) = 14
Flood Wave Arrival Time (hr:min) = 1:10
Time to Peak Flood Stage (hr:min) = 1:15

Gypsum Creek Downstream Structure
11.87 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 23,285
Maximum Water Surface Elevation (ft) = 7,310
Maximum Stage (ft) = 13
Flood Wave Arrival Time (hr:min) = 1:05
Time to Peak Flood Stage (hr:min) = 1:11

Gypsum Creek Downstream Structure
10.06 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 23,903
Maximum Water Surface Elevation (ft) = 7,654
Maximum Stage (ft) = 13
Flood Wave Arrival Time (hr:min) = 0:57
Time to Peak Flood Stage (hr:min) = 1:03

Map Sheet 5
Map Sheet 4
MATCHLINE
MATCHLINE
Map Sheet 4
Map Sheet 3



L.E.D.E Reservoir Enlargemment
Dam Failure Inundation Map

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MAP SHEET: 4

PROJECT: 93503.20

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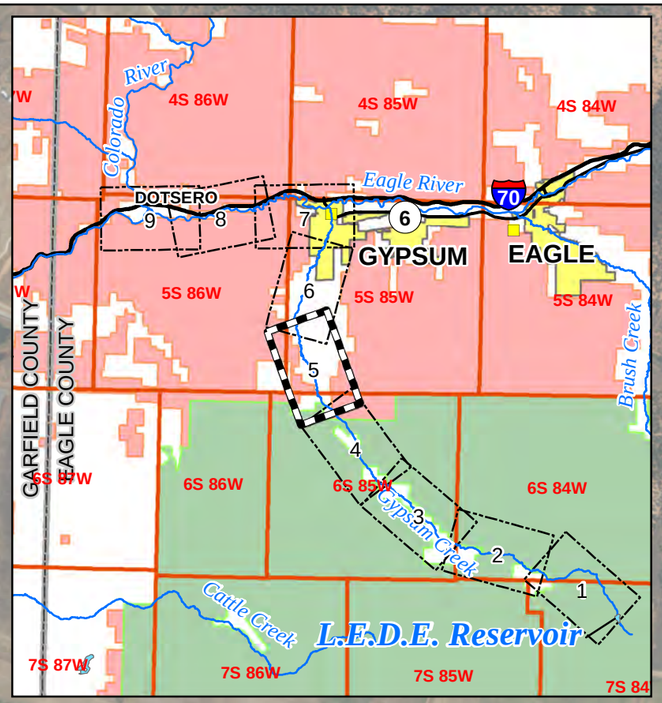

0 1,000 2,000 Feet

MATCHLINE

Map Sheet 6

Map Sheet 5

MATCHLINE

Map Sheet 5

Map Sheet 4

Gypsum Creek Little G Water Intake

13.14 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 23,174
Maximum Water Surface Elevation (ft) = 7,044
Maximum Stage (ft) = 14
Flood Wave Arrival Time (hr:min) = 1:10
Time to Peak Flood Stage (hr:min) = 1:15

L.E.D.E Reservoir Enlargemment
Dam Failure Inundation Map

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MAP SHEET: 5

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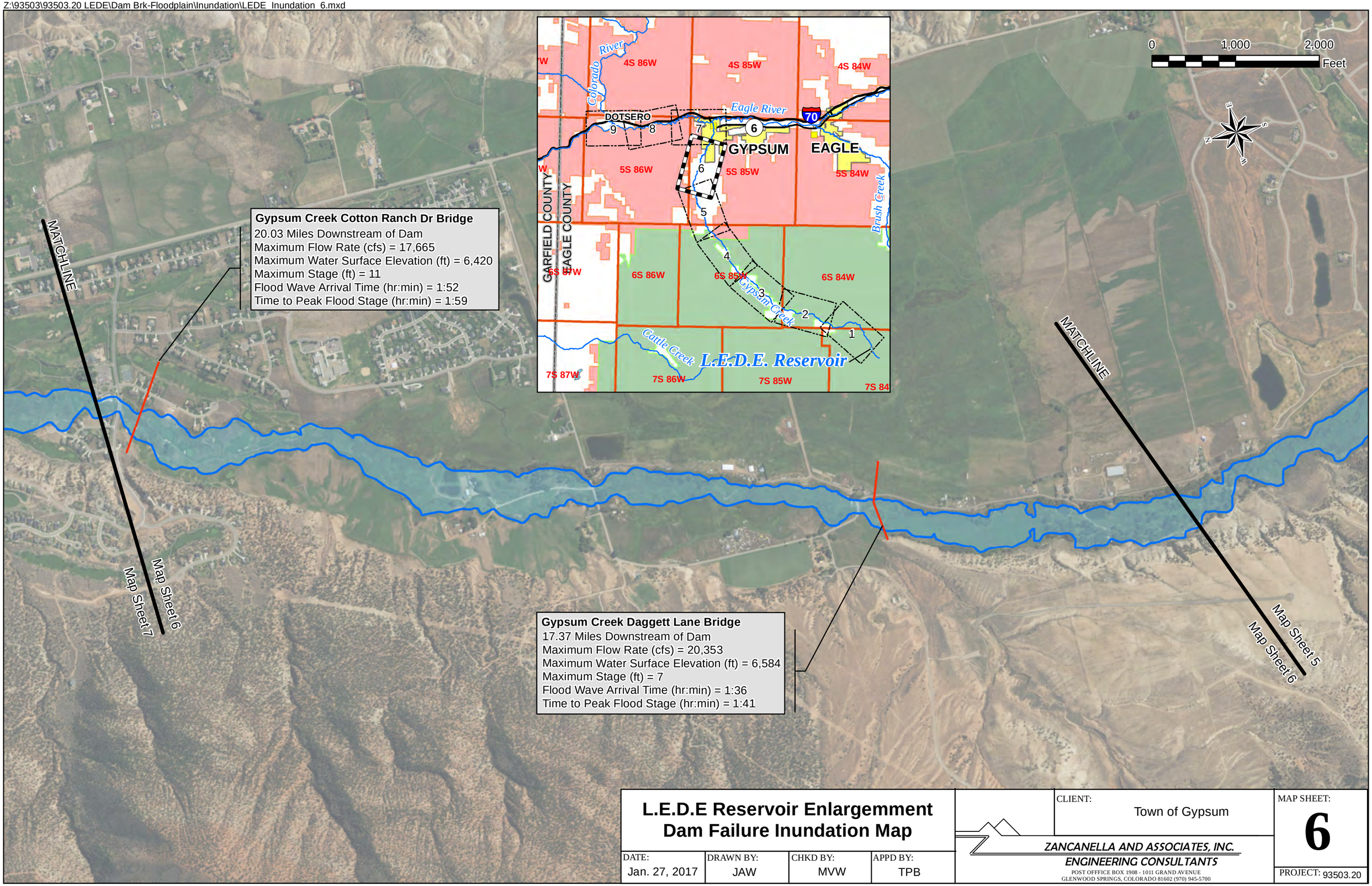

Gypsum Creek Cotton Ranch Dr Bridge
20.03 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 17,665
Maximum Water Surface Elevation (ft) = 6,420
Maximum Stage (ft) = 11
Flood Wave Arrival Time (hr:min) = 1:52
Time to Peak Flood Stage (hr:min) = 1:59

Gypsum Creek Daggett Lane Bridge
17.37 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 20,353
Maximum Water Surface Elevation (ft) = 6,584
Maximum Stage (ft) = 7
Flood Wave Arrival Time (hr:min) = 1:36
Time to Peak Flood Stage (hr:min) = 1:41

L.E.D.E Reservoir Enlargemment
Dam Failure Inundation Map

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MAP SHEET: **6**

PROJECT: 93503.20

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0 1,000 2,000 Feet

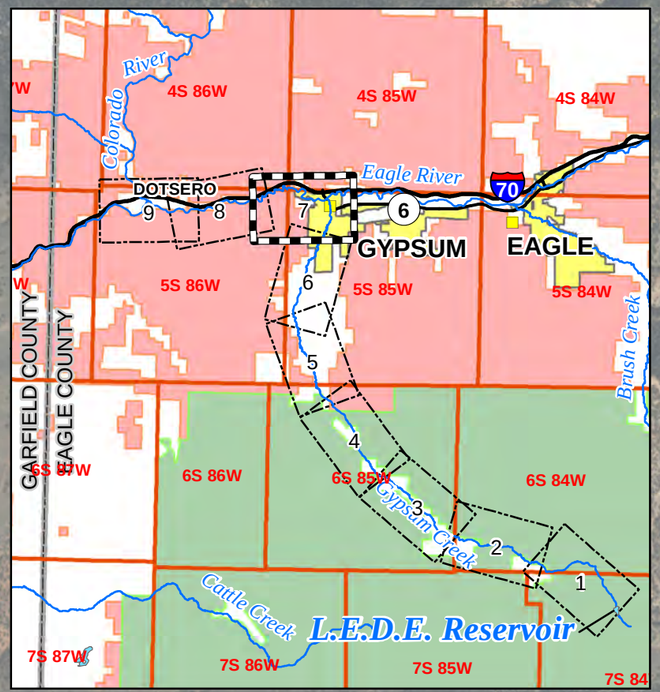
N W E S

Eagle River Above 6 Bridge
21.90 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 16,009
Maximum Water Surface Elevation (ft) = 6,288
Maximum Stage (ft) = 15
Flood Wave Arrival Time (hr:min) = 2:08
Time to Peak Flood Stage (hr:min) = 2:16

Eagle River Above Price Lane Bridge
22.90 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 11,938
Maximum Water Surface Elevation (ft) = 6,266
Maximum Stage (ft) = 10
Flood Wave Arrival Time (hr:min) = 2:19
Time to Peak Flood Stage (hr:min) = 2:44

Gypsum Creek Vicksburg Ln Bridge
20.95 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 16,473
Maximum Water Surface Elevation (ft) = 6,379
Maximum Stage (ft) = 10
Flood Wave Arrival Time (hr:min) = 1:58
Time to Peak Flood Stage (hr:min) = 2:07

MATCHLINE
Map Sheet 8
Map Sheet 7
MATCHLINE
Map Sheet 7
Map Sheet 6



L.E.D.E Reservoir Enlargemment
Dam Failure Inundation Map

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MAP SHEET: **7**

PROJECT: 93503.20

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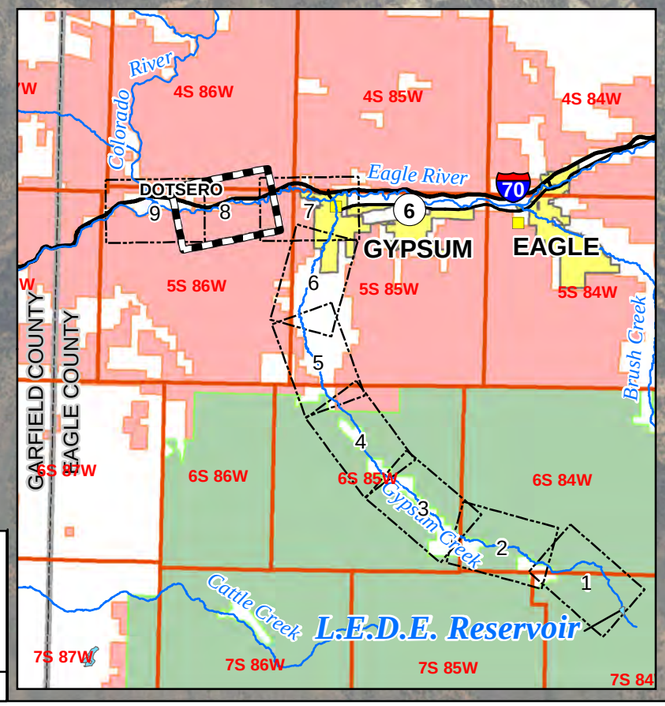
0 1,000 2,000 Feet

N W E S

Eagle River at Open Space Acess
27.17 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 6,595
Maximum Water Surface Elevation (ft) = 6,203
Maximum Stage (ft) = 9
Flood Wave Arrival Time (hr:min) = 3:20
Time to Peak Flood Stage (hr:min) = 4:49

Eagle River at Riverdance RV Park
26.1 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 7,781
Maximum Water Surface Elevation (ft) = 6,213
Maximum Stage (ft) = 7
Flood Wave Arrival Time (hr:min) = 3:06
Time to Peak Flood Stage (hr:min) = 4:09

Map Sheet 9
Map Sheet 8
Map Sheet 8
Map Sheet 7
MATCHLINE
MATCHLINE



L.E.D.E Reservoir Enlargemment
Dam Failure Inundation Map

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Jan. 27, 2017	JAW	MVW	TPB

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MAP SHEET: **8**

PROJECT: 93503.20

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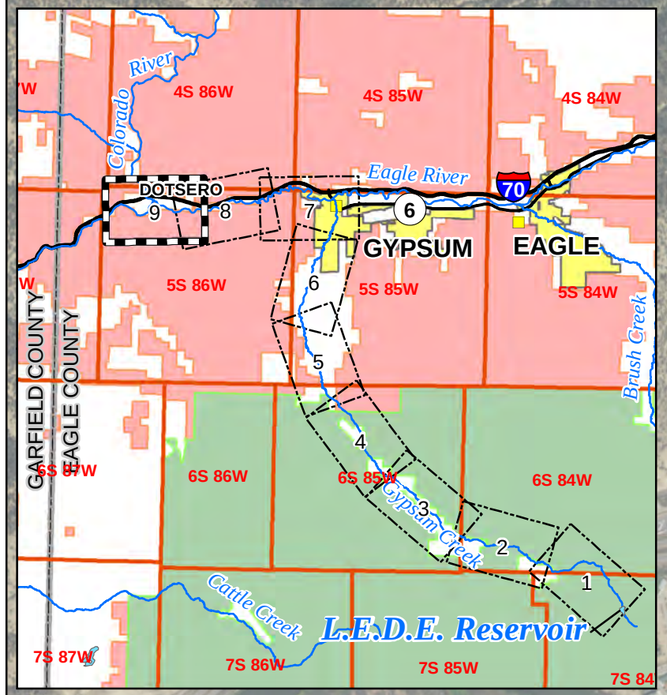

0 1,000 2,000 Feet

N W E S

MATCHLINE

Map Sheet 8

Map Sheet 9

Confluence With Colorado River
29.79 Miles Downstream of Dam
Maximum Flow Rate (cfs) = 6,248
Maximum Water Surface Elevation (ft) = 6,139
Maximum Stage (ft) = 7
Flood Wave Arrival Time (hr:min) = 4:16
Time to Peak Flood Stage (hr:min) = 5:15

L.E.D.E Reservoir Enlargemment
Dam Failure Inundation Map

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MAP SHEET: 9

PROJECT: 93503.20