Climax Molybdenum
A Freeport-McMoRan Company

Climax Mine
Highway 91 - Fremont Pass
Climax, CO 80429
Phone (719) 486-7718
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Sent by Certified Mail

April 09, 2014

Mr. Eric Scott
Environmental Protection Specialist
Division of Reclamation, Mining and Safety
Department of Natural Resources
1313 Sherman St. Room 215
Denver, Colorado 80203

Re: Hydraulic Evaluation of Clean Water Interceptor System, Climax Mine, Permit No. M-1977-493, Technical Revision 18 – Environmental Protection Plan

Dear Mr. Scott:

Attached please find a March 19, 2014 technical memorandum from Wheeler & Associates, Inc. that evaluates the Climax Molybdenum Company – Climax Mine (Climax) clean water interceptor systems. The technical memorandum was prepared in accordance with our December 15, 2011 response to the DRMS adequacy review of TR-18 – Environmental Protection Plan.

Please contact me at 719-486-7584 if you have any questions on the evaluation.

Sincerely,

Raymond Lazuk
Environmental Manager

attachment

W. W. WHEELER
& ASSOCIATES, INC.
Water Resources Engineers
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3700 S. Inca Street | Englewood, CO 80110-3405
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TECHNICAL MEMORANDUM

March 19, 2014

To: Ray Lazuk
Climax Molybdenum Company

From: Jeremy Wells, P.E. and Michael Stonefelt, P.E.
W. W. Wheeler & Associates, Inc.

Re: Climax Mine Interceptor Evaluation

No: 1051.27.02

1.0 INTRODUCTION

Wheeler has completed an evaluation of the existing conditions of the Climax Mine fresh water interceptor systems. The purpose of the evaluation was to determine whether the interceptor systems have sufficient hydraulic capacity to safely pass the runoff expected from a storm event with a 10-year return period (frequency). This evaluation fulfills the requirements as set forth in TR-18 for the *Colorado Division of Reclamation, Mining, and Safety* (DRMS) as stated:

> *"… Climax proposes to conduct a comprehensive inspection of the interceptor systems during the upcoming snowmelt runoff period in the spring of 2012. The data collected from the initial inspection, subsequent field surveys, if warranted, and hydrologic analyses will then be used to determine that the systems can safely pass a 10-yr / 24-hr rainfall event."*

The interceptor systems that were included in this analysis are the Chalk Mountain Interceptor, East Interceptor, and West Interceptor. The evaluation involved four distinct phases, as described below.

Phase I: Wheeler performed a field reconnaissance of the interceptor systems during the 2012 snowmelt runoff period. The intent of this phase was to observe the interceptor systems in operation and identify problem areas or areas with limited capacity. The open canals, pipes, culverts, and other interceptor appurtenances were photo-documented and basic measurements were taken to provide a cursory understanding of the system. The 2012 snowpack was one of the lowest on record thereby generating relatively low flow rates in the interceptors, even though the field reconnaissance was performed at approximately the peak of the snowmelt runoff.

<u>Phase II</u>: Wheeler oversaw a field survey of the interceptor systems to collect survey data for the canal alignment, cross-sectional dimensions, and profile slope of the interceptors. These data were needed for the planned hydrologic and hydraulic analyses to determine their flood routing capacities. The survey was performed by InterMountain Engineering in August 2012 and consisted primarily of representative cross-sections used to define alignment, invert profile, bottom width, side slopes, bank crests, and culvert dimensions for each system. The survey data were subsequently inserted into an AutoCAD drawing on the Climax coordinate system. The surveyed point files could be provided upon request.

<u>Phase III</u>: Wheeler developed a HEC-HMS hydrology model and a HEC-RAS hydraulics model of each system using data from Wheeler's previously developed hydrology models and the field survey. HEC-HMS is a rainfall-runoff model, similar to HEC-1, published by the U.S. Army Corps of Engineers to evaluate watershed hydrology. HEC-RAS is a one-dimensional hydraulics model to evaluate steady-state and unsteady-state hydraulics of open channels, culverts, and pipe systems. These models were used in concert to compare the capacities of the interceptors to the modeled runoff rates from a rainfall event with a duration of 24 hours and an estimated return period of 10 years.

<u>Phase IV</u>: Wheeler performed a second field reconnaissance of the interceptor system in 2013. The intent of this phase was to compare the survey data and analysis results with actual site conditions. New information that was identified during the second field investigation was then incorporated into the hydraulics analyses and report.

The subsequent paragraphs describe the results and conclusions of the evaluation.

2.0 SYSTEM CONFIGURATION

The existing interceptor system consists of a series of open canals and pipelines that collect unimpacted surface runoff from the drainage basins above the Climax Mine industrial area and convey that water around the site to the natural stream channels near the property's edge. The intent of these systems is to reduce the volume of potentially impacted water and therefore reduce the quantity of water requiring treatment prior to release to the natural stream systems. The interceptor systems evaluated herein include the Chalk Mountain Interceptor, East Interceptor, and West Interceptor. Detailed descriptions of these systems are provided below. Figure 1 provides a general arrangement map showing the primary alignment of these systems and how they are arranged within the Climax Mine site.

2.1 Chalk Mountain Interceptor

The Chalk Mountain Interceptor extends for approximately 16,000 feet from Fremont Pass along the northeast side of Chalk Mountain to the East Fork of the Upper Eagle River. The canal discharges into the natural stream system downstream of Eagle Park Reservoir or optionally into Eagle Park Reservoir. Diversions into Eagle Park Reservoir are controlled by the Eagle Park Reservoir Company. This system intercepts runoff that would otherwise flow into Robinson Tailing Storage Facility (TSF), Chalk Mountain Reservoir, Tim's Pond, Robinson Lake, and the Robinson Dam seepwater collection system. The reach of the interceptor between the Robinson Dam seepwater collection system and the East Fork of the Upper Eagle River was not considered in this evaluation because that reach is not up-gradient of Climax Mine industrial facilities. Figure 2 provides a general arrangement map of the Chalk Mountain Interceptor system.

2.2 East Interceptor

The East Interceptor extends for approximately 28,000 feet along the east side of the Tenmile Creek valley. It begins in McNulty Gulch, traverses along the eastern edges of Robinson TSF and Tenmile TSF, and discharges into Clinton Reservoir. From there, the Clinton Canal portion extends for about 7,000 feet from the outlet works and spillway of Clinton Dam and discharges into a reconstructed section of Mayflower Creek. The Mayflower Canal portion then continues another 7,000 feet and discharges into Tenmile Creek near its confluence with Humbug Creek near the Property Discharge Water Treatment Plant (PDWTP). The East Interceptor System intercepts runoff that would otherwise flow into McNulty Gulch, Robinson TSF, Tenmile TSF, Mayflower TSF, the 3 Dam seepage collection system, and the 5 Dam seepage collection system. The East Interceptor system does not impact the natural Clinton Reservoir watershed. The reaches from McNulty Gulch to the south end of Tenmile TSF and from 3 Dam to Clinton Reservoir are piped with periodic inlets. The remainder of the interceptor system is open channel. As part of this system, several culverts convey runoff under Highway 91 and direct that runoff to inlets into the East Interceptor system. Figure 3 provides a general arrangement map of the East Interceptor system.

2.3 West Interceptor

The West Interceptor extends for approximately 32,000 feet along the west side of the Tenmile Creek valley. This system intercepts Kokomo Creek, Searle Gulch, several unnamed drainages, and overland surface runoff from the west side of the valley and discharges into Tucker Creek. This system intercepts runoff that would otherwise flow into Robinson TSF, Tenmile TSF, Mayflower TSF, the 3 Dam seepage collection system, and the 5 Dam seepage collection system. The open canal begins just north of Lake Irwin near the west abutment of 2 Dam and extends to Searle Gulch, where the canal transitions into buried pipe. The buried pipe section collects surface runoff thru several inlets and eventually discharges into Tucker Creek between 5 Dam Pump Station and the PDWTP. Figure 4 provides a general arrangement map of the West Interceptor system.

3.0 HYDROLOGY

The HEC-HMS model was used to evaluate the rainfall-runoff relationships for each of the subbasins tributary to the interceptor systems. The key parameters associated with developing the inflow hydrology for the rainfall discharges for the site are summarized below.

3.1 Drainage Basin Characteristics

Figure 1 shows the overall watershed boundaries for the three interceptor systems. Figures 2, 3, and 4 show the individual drainage basins that were modeled in HEC-HMS for the Chalk Mountain Interceptor, East Interceptor, and West Interceptor systems, respectively. The watershed boundaries and dimensional parameters for the drainage basins were generated from USGS 7.5-minute quadrangle maps along with information and site understanding developed during the field reconnaissance phase of this project. The key watershed parameters are shown in Table 1 below.

3.2 Basin Soils and Infiltration

The HEC-HMS model uses the SCS Curve Number method to approximate runoff during storm events. This is an empirical method, based on an extensive database of soils maps and site-specific rainfall-runoff studies, which uses cumulative precipitation, soil cover, and land use to estimate precipitation excess from a storm event.

A composite Curve Number was calculated for each drainage basin using soil data from the Holy Cross Soil Survey (USDA, 2003). The Curve Numbers used in the model range from 72 to 77. The average Curve Number was 74, which corresponds to Hydrologic Soil Group C with a woods-grass combination cover type (USDA, 2004). Much of the soils at the site are consistent with Hydrologic Soil Group B, which has a lower runoff potential than Hydrologic Soil Group C. However, the Curve Numbers used are only slightly conservative, because much of the drainage area at the site is above timberline with shallow or exposed bedrock and high runoff potential consistent with Hydrologic Soil Group D.

The Curve Number for each basin was used to calculate the potential retention, a measure of the ability of a drainage basin to abstract and retain storm precipitation thereby reducing the amount of excess precipitation that runs off the site. The initial loss for each basin was set to five percent of the basin’s potential retention. This initial loss estimate is based partially on site runoff observations made during several 2012 storm events.

Table 1. Sub-Basin Hydrologic Characteristics

Interceptor System	Basin	Area (sq. mi.)	SCS Curve Number	Initial Loss (in)
West	Searle Gulch	2.60	77	0.149
	Kokomo Creek	1.31	75	0.167
	E. Sheep Mtn. Upper	0.33	72	0.194
	E. Sheep Mtn. Lower	0.09	72	0.194
	E. Sheep Mtn. NE	0.08	74	0.176
	Corbett Peak	0.57	75	0.167
	Jacque Peak South	0.61	74	0.176
	Rose Gulch	0.51	73	0.185
	Jacque Peak East	0.20	73	0.185
East	McNulty Gulch	0.34	73	0.185
	Mayflower Creek	3.20	77	0.149
	McNulty Gulch West	0.35	73	0.185
	Carbonate Hill	0.64	76	0.158
	Clinton Canal	0.43	74	0.176
	Mayflower Canal	0.43	77	0.149
Chalk Mtn.	Chalk Mountain East	0.40	73	0.185
	Chalk Mountain West	0.78	73	0.185

3.3 Precipitation

Wheeler performed a Log Pearson Type III statistical analysis using over 50 years of daily precipitation data from the Climax Weather Station to estimate a 24-hour-duration precipitation depth for the 10-year-frequency storm. The precipitation was distributed over a 24-hour period according to the NOAA Atlas II rainfall depth-durations for Colorado, Region 2. Table 2 presents the depth-duration data used in the HEC-HMS model.

Table 2. Climax Weather Station Rainfall Depth-Duration for 10-Year Storm.

Duration	Depth (inches)
5-min	0.21
10-min	0.33
15-min	0.41
30-min	0.57
1-hr	0.73
2-hr	0.82
3-hr	0.87
6-hr	0.99
12-hr	1.17
24-hr	1.40

3.4 Runoff Hydrographs

The runoff hydrographs for the drainage basins in the HEC-HMS model were developed using either the unit hydrograph method or the kinematic wave method.

The unit hydrograph method was used for basin configurations where a well-defined main channel is present and basin runoff enters the interceptor at a single point. The Flood Hydrology Manual (USBR, 1989) presents a separate hydrograph lag time relationship for each of the two basic types of storm phenomena apparent in data from numerous Rocky Mountain basins. These two basic storm types are the low-intensity general storm and the high-intensity thunderstorm. Basin-wide roughness coefficients that are representative of general storms, ranging from 0.13 to 0.26, are generally considered more appropriate for developing runoff hydrographs of more common frequency than the 100-year storm event (USBR, 1989). Basin-wide roughness coefficients of 0.20 were selected for this analysis.

The kinematic wave method was used for basin configurations where basin runoff is routed to the interceptor through several small drainages and a well-defined main channel is not present. Using this method, excess precipitation is routed across overland flow planes to collector channels that run more or less perpendicular to the interceptor canal. The parameters used to characterize the overland flow planes and collector channels are flow distance, slope, overland-flow coefficients, and channel roughness coefficients. Overland-flow coefficients of 0.6 for the flow planes and channel roughness coefficients of 0.1 for the collector channels were selected based on ground surface characteristics.

3.5 Base Flow

The NRCS Fremont Pass SNOTEL site is located on Chalk Mountain near Fremont Pass, at the southwest side of the Climax Mine site. The snowpack typically peaks in May and snowmelt runoff typically occurs over about a 45-day period in June and July. To account for the scenarios where the 10-year rainfall event could overlap the tail end of the snowmelt runoff period, the drainage basins were modeled both with and without a snowmelt base flow. A snowmelt base flow rate of 7.76 cfs per square mile of drainage basin area was used for this analysis. This rate coincides with the 30-day average snowmelt runoff from a 2-year snowmelt, based on a previous analysis of the Black Gore Creek basin near Vail.

The Clinton Canal portion of the East Interceptor was modeled with a base flow of 100 cfs to account for possible releases from Clinton Reservoir. This is a conservative assumption, because the Clinton Canal is typically operated at a much lower flow rate. A 1996 report by Resource Engineering indicates that the Clinton Canal channel would begin to erode at a flow rate of about 100 cfs even though the channel volumetric capacity is much greater. A base flow of 100 cfs in the Clinton Canal was selected for this analysis because it is unlikely that the Clinton Canal would intentionally be operated at a flow rate exceeding this limit. Note that releases from Clinton Reservoir into the Clinton Canal are controlled by the Clinton Reservoir Company.

4.0 FLOOD ROUTING CAPACITY

HEC-RAS geometry, including the cross-sectional dimension, alignment, and profile data, were developed from the surveyed cross sections for each of the interceptors. A Manning's roughness coefficient of 0.030 was used for the main channel and a Manning's roughness coefficient of 0.035 was used for the left and right overbank areas in the HEC-RAS model. These Manning's roughness values were selected to be somewhat conservative to produce a deeper water depth. Lower Manning's roughness values would produce a slightly higher flow velocity and lower water depth. Steady state and unsteady state simulations were used to route the runoff hydrographs generated from the HEC-HMS model through each of the interceptors for the 10-year rainfall event with no base flow and for the 10-year rainfall event with the 2-year snowmelt base flow (i.e. rain-on-snow event).

5.0 RESULTS

The estimated flood routing capacity of the interceptor system in terms of each interceptor's ability to route the 10-year rainfall event and the 10-year rain-on-snow event is illustrated in Figures 5, 6, and 7 and described in the following sections. The coefficients and other assumed parameters used in this analysis were based on expected site conditions during the respective events. Actual flooding conditions may vary from the information presented here depending on antecedent moisture conditions and snowmelt runoff conditions at the time of the storm.

5.1 Chalk Mountain Interceptor

The majority of the Chalk Mountain Interceptor system has sufficient capacity to convey the 10-year rainfall event without overtopping. However, the 36-inch CMP culvert crossing under the road to the Observatory near Station 95+00 is expected to overtop by a few inches. This culvert is shown in Photograph 1. Water that overtops the Chalk Mountain Interceptor at this location would either flow down the interceptor access road and back into the interceptor or overflow the access road and be fully contained in Chalk Mountain Reservoir, which is within the Climax industrial area.

Figure 5 shows the alignment of the Chalk Mountain Interceptor and highlights the reach with insufficient capacity to pass the storm events evaluated.

5.2 East Interceptor

The model results indicate that the East Interceptor is capable of passing the 10-year rainfall event and the 10-year rain-on-snow event without overtopping. Figures 6a and 6b show the alignment of the East Interceptor, highlighting the entire interceptor as having sufficient capacity to pass the storm events evaluated.

5.3 West Interceptor

In its current configuration, the West Interceptor does not have adequate capacity to pass the 10-year rainfall event without overtopping. Figures 7a and 7b show the alignment of the West Interceptor and highlight the reaches with insufficient capacity to pass the storm events evaluated. As a general observation, the slope of the West Interceptor is very flat, which promotes slower velocities and deeper water depths. Water that overtops the West Interceptor channel south of 3Dam would be fully contained in Tenmile TSF. Water that overtops the West Interceptor channel between 3Dam and 5Dam would discharge directly into the Mayflower TSF or into the lower reaches of Kokomo Creek and Searle Creek, which also discharge into Mayflower TSF.

The upper end of the West Interceptor consists of two separate channels that combine at about Station 58+00. The stationing in Figures 7a and 7b follows the upper channel until the 36-inch culvert near Station 28+00 that directs runoff to the lower channel, then follows the lower channel to the confluence at Station 58+00. This is the route that the majority of runoff will follow during a storm event. The two sections that are not stationed are: 1) the lower channel from the start of the interceptor system to the discharge from the 36-inch culvert, and 2) the upper channel from the 36-inch culvert to the confluence of the upper and lower channels at about Station 58+00. These two small reaches collect minimal runoff and are expected to pass the 10-year rainfall and rain-on-snow events, except as noted below.

Three of the reaches shown to have insufficient capacity in Figures 7a and 7b correspond to three restrictive culvert locations. There is also currently damage at a fourth culvert. These culvert locations are described below.

The 1,890-foot-long 46-inch-diameter CMP section that begins at about Station 137+00 and discharges into Searle Gulch is severely damaged in several locations and has been partially replaced with 42-inch HDPE pipe, as shown in Photograph 2. The entrance to this pipe is shown in Photograph 3. The overflow pipe indicated in Photograph 3 was likely installed after previous occurrences of overtopping at this location. Regardless of the damage, the existing pipe cannot pass the 10-year rainfall event because of its very flat slope of 0.002 feet per foot.

The two parallel CMP culverts near Station 118+00, shown in Photograph 4, do not match the invert and slope of the channel. The size of these culverts is generally adequate. However, the invert of one of the culverts is about six inches above the channel, and the other culvert is at a negative slope. This causes water to back up in the channel at low flows and overtop the channel at peak flows.

The 14-inch HDPE culvert on the upper channel just before the confluence of the upper and lower channels at about Station 58+00 has sufficient capacity to pass the 10-year rainfall event but causes overtopping during the 10-year rain-on-snow event. The existing 14-inch HDPE culvert at this location is shown in Photograph 5.

Lastly, the discharge end of the 24-inch CMP culvert on the lower channel just before the confluence of the upper and lower channels at about Station 58+00 is damaged. The existing 24-inch CMP culvert is shown in Photograph 6.

Diversion Structures

The flood routing capacities shown in the figures assume that the overflow structures at Kokomo Creek and Searle Gulch function as intended. These structures were designed with overflow provisions that would convey some unimpacted surface runoff into the Climax industrial area during major storm events. This configuration is intended to protect the canal by preventing uncontrolled overtopping if runoff flows exceed the interceptor capacity. The flood routing abilities of the West Interceptor downstream of Kokomo Creek and Searle Gulch rely on the existing overflow structures. Photograph 7 and Photograph 8 show the existing configuration of the interceptor at these two locations.

For this analysis, the gates into the interceptor were assumed to be fully open, and all runoff was routed through the interceptor until the headwater backed up to the crest of the respective overflow structure. However, if the operators foresee the potential for overtopping in the interceptor reach downstream of the diversion structure, these gates could be partially or fully closed to bypass the interceptor. These gates are part of the management system to prevent overtopping.

The overflow structure at Kokomo Creek consists of a 48-inch CMP crossing under the service road. The overflow structure at Searle Gulch consists of a 10-foot-wide weir that discharges into a box culvert crossing under the service road. The two 24-inch slide gates that can be used to divert water into the Climax industrial area at the Searle Gulch diversion structure were assumed to be closed for this analysis.

Table 3 provides a summary of the flow rate and percentage of the peak flow rate that would overflow at these structures for the storm events considered, assuming that the gates into the interceptor were fully open.

Table 3. West Interceptor Overflow Structure Flow Rates.

Overflow Structure	10-Year Rainfall Event	10-Year Rain-On-Snow Event
Kokomo Creek	21 cfs (21%)	28 cfs (25%)
Searle Gulch	140 cfs (54%)	154 cfs (56%)

The West Interceptor after Searle Gulch consists of 46-inch to 50-inch-diameter CMP until the end of the West Interceptor at Tucker Creek. The runoff entering this piped section during the 10-year rainfall and rain-on-snow events exceeds the gravity-flow capacity of the pipe, causing the inlet at the Searle Gulch diversion structure to be submerged. The capacity of this piped section apparently has been exceeded before, as indicated by several overflow culverts that have been installed near existing interceptor inlets to route runoff over and across the interceptor pipe and into the industrial area. The locations of the interceptor inlets – two of which have been capped – and the overflow culverts are shown on Figure 7b. Any water that crosses the West Interceptor through these overflow culverts would discharge into and be fully contained in Mayflower TSF.

6.0 CONCLUSIONS

The following conclusions have been garnered from this analysis:

1. The interceptor systems at the Climax Mine have served their intended function for many years by reducing the volume of unimpacted surface runoff that enters the industrial area.
2. Except for the 36-inch CMP culvert crossing under the road to the Observatory near Station 95+00, the Chalk Mountain Interceptor can pass the 10-year rainfall event.
3. The East Interceptor can pass both the 10-year rainfall and 10-year rain-on-snow events in its current configuration.
4. The West Interceptor does not currently have adequate capacity to pass the 10-year rainfall event without overtopping when the gates into the interceptor at the overflow structures are fully open. Climax operators have the ability to reduce flow into downstream reaches of the West Interceptor by partially or fully closing the interceptor gates at the Kokomo and Searle diversion structures. As a general observation, the slope of the West Interceptor is very flat, which promotes slower velocities and deeper water depths. Water that overtops the West Interceptor upstream of 5Dam would discharge into and be fully contained by Tenmile TSF and Mayflower TSF.

7.0 REFERENCES

1. U.S. Department of Agriculture (USDA), Soil Survey of Holy Cross Area, Colorado, White River National Forest, 2003.

2. U.S. Bureau of Reclamation (USBR), Flood Hydrology Manual, 1989.

3. Resource Engineering, Inc., Clinton Canal Flow Release Test, Glenwood Springs, Colorado, 1996.

4. U.S. Department of Agriculture (USDA), National Engineering Handbook Part 630, Chapter 9, 2004.

5. U.S. Army Corps of Engineers (USACE) HEC-RAS River Analysis System, User’s Manual, 2010.

6. U.S. Army Corps of Engineers (USACE) HEC-HMS Hydrologic Modeling System, User’s Manual, 2010.

Photograph 1. Chalk Mountain Interceptor 36-Inch CMP culvert under the Observatory road at about Station 95+00.

Photograph 2. West Interceptor CMP damage upstream of Searle Gulch at about Station 150+00.

Photograph 3. West Interceptor pipe entrance and overflow pipe upstream of Searle Gulch at about Station 137+00.

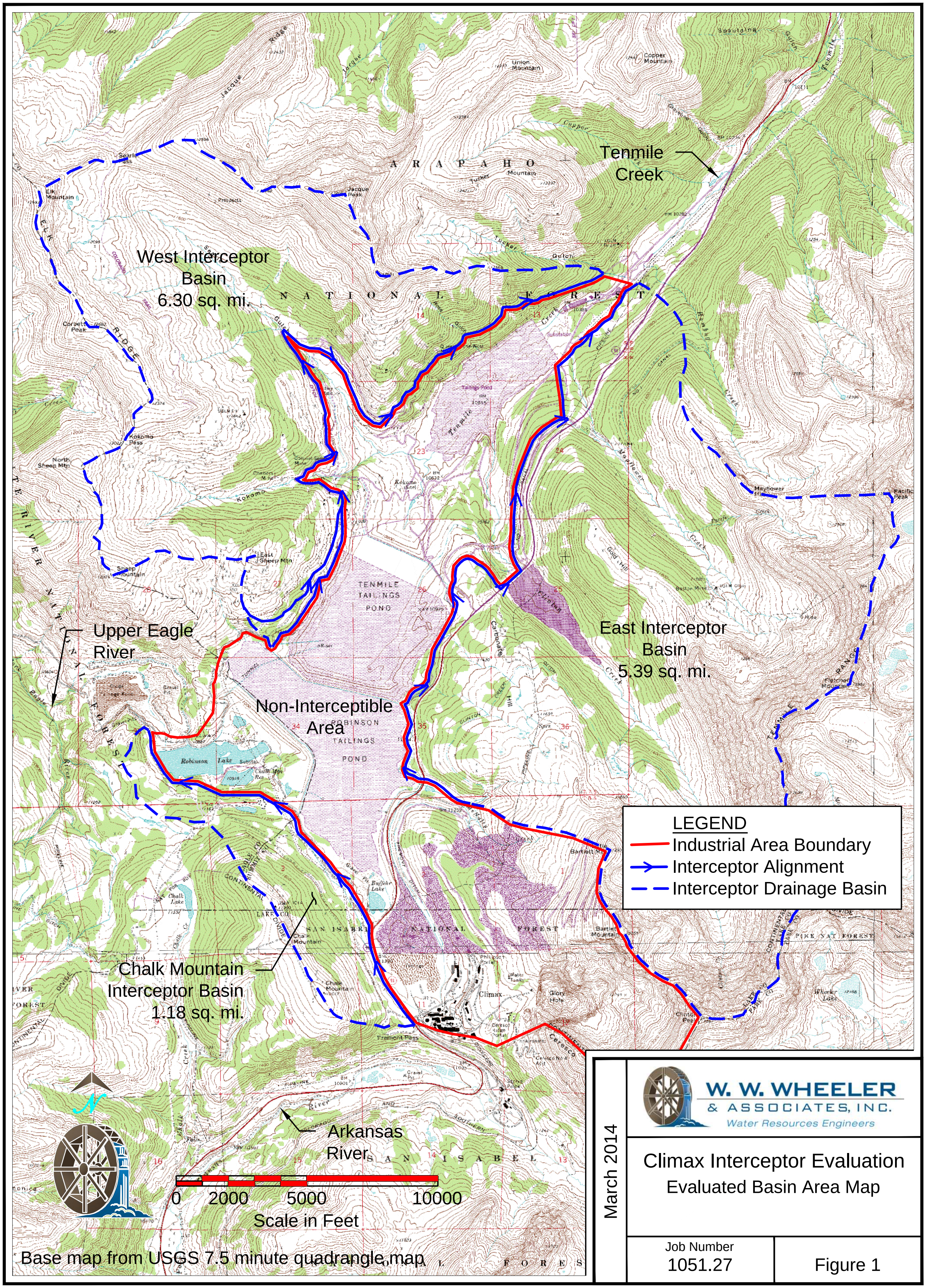
Photograph 4. Culverts near Station 118+00 do not match the invert and slope of the channel.

Photograph 5. Entrance to 14-inch HDPE culvert on the upper channel of the West Interceptor before junction with lower channel at about Station 58+00.

Photograph 6. Entrance to 24-inch CMP culvert on the lower channel near Station 57+00.

Photograph 7. West Interceptor Bypass Structure at Kokomo Creek at about Station 85+00.

Photograph 8. West Interceptor Bypass Structure at Searle Gulch at about Station 155+00.



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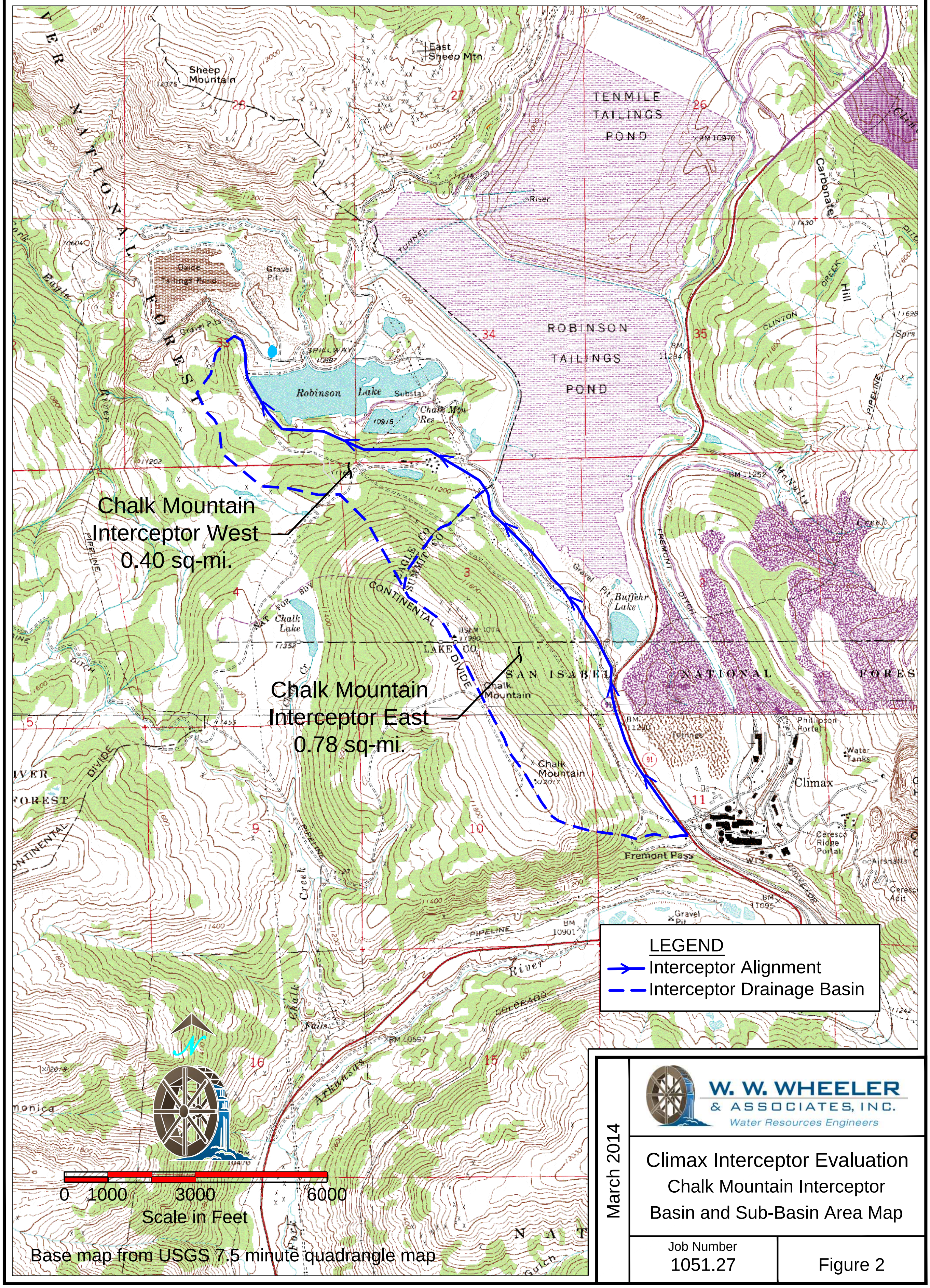

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

March 2014

Climax Interceptor Evaluation
Chalk Mountain Interceptor
Basin and Sub-Basin Area Map

Job Number	
1051.27	Figure 2

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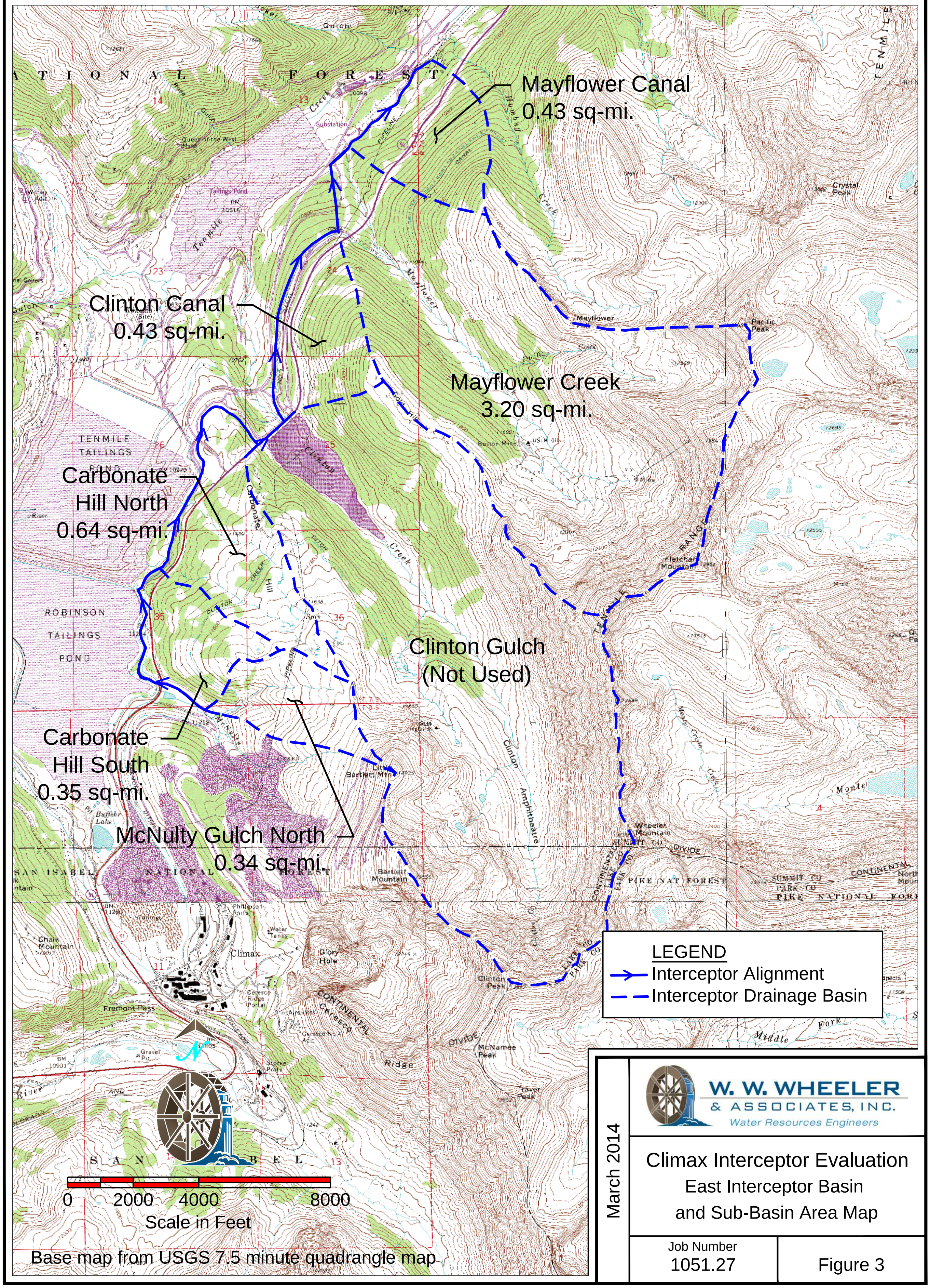

March 2014

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

Climax Interceptor Evaluation
East Interceptor Basin
and Sub-Basin Area Map

Job Number	
1051.27	Figure 3

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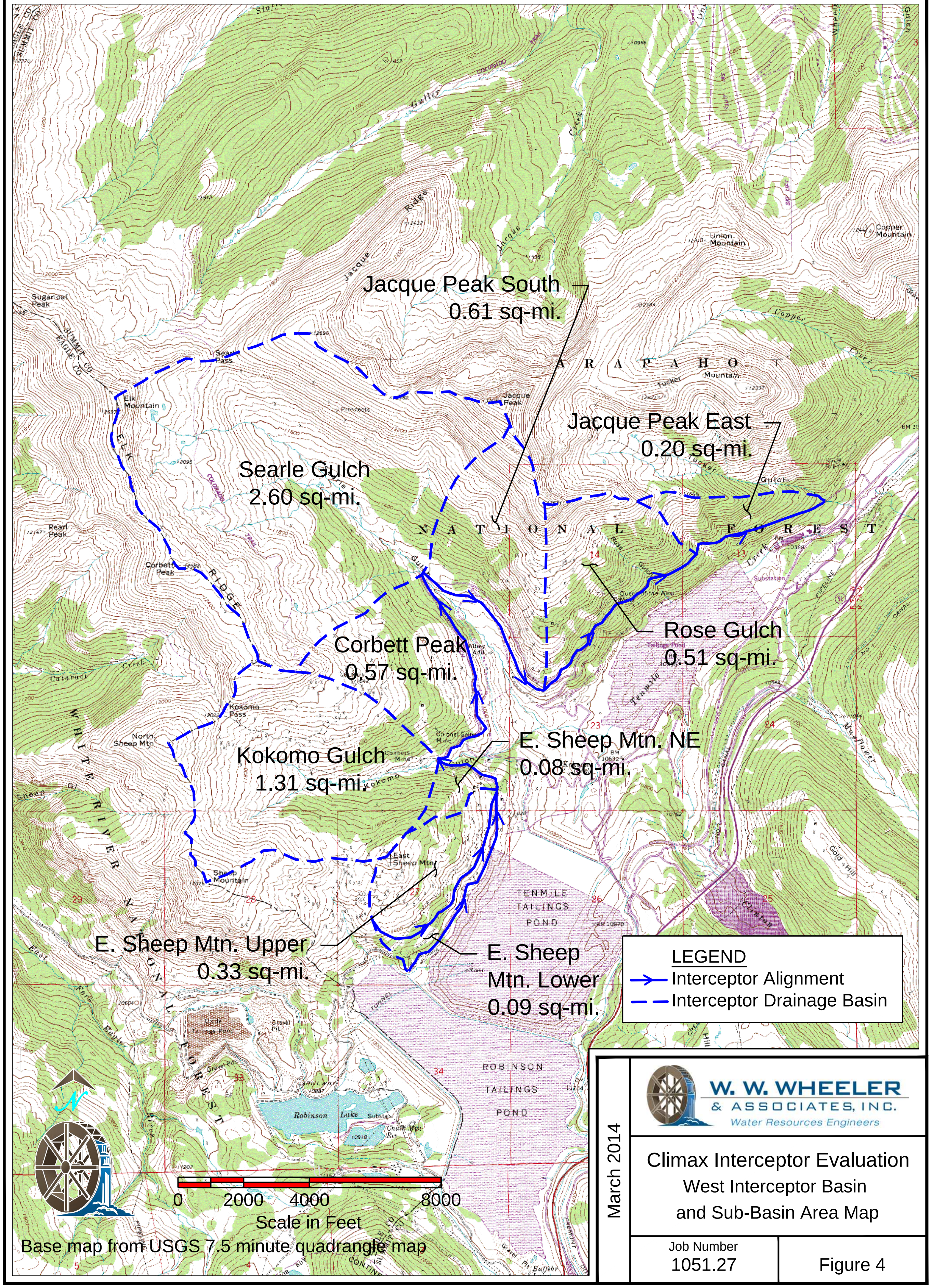

March 2014

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

Climax Interceptor Evaluation
West Interceptor Basin
and Sub-Basin Area Map

Job Number	
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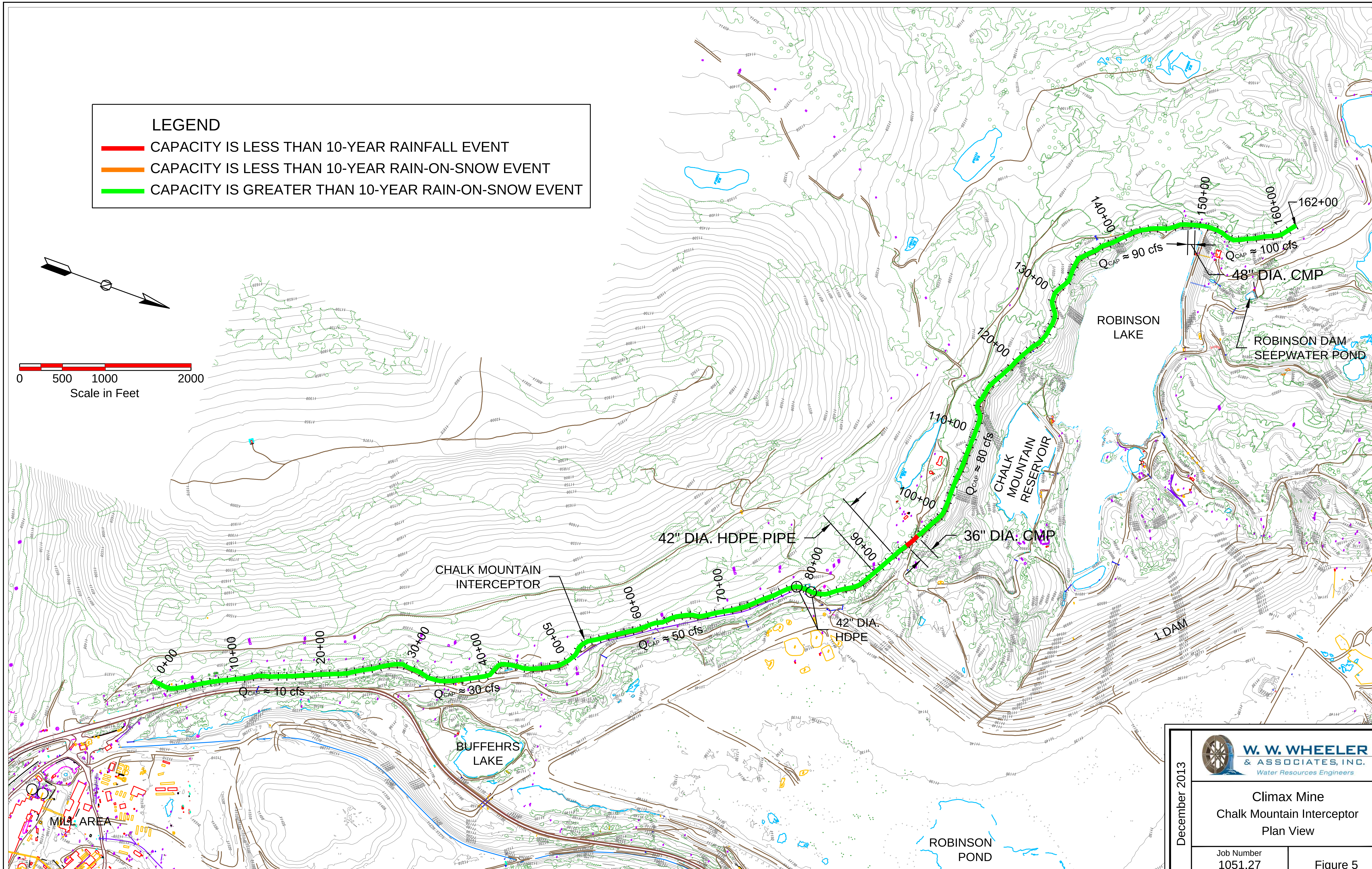
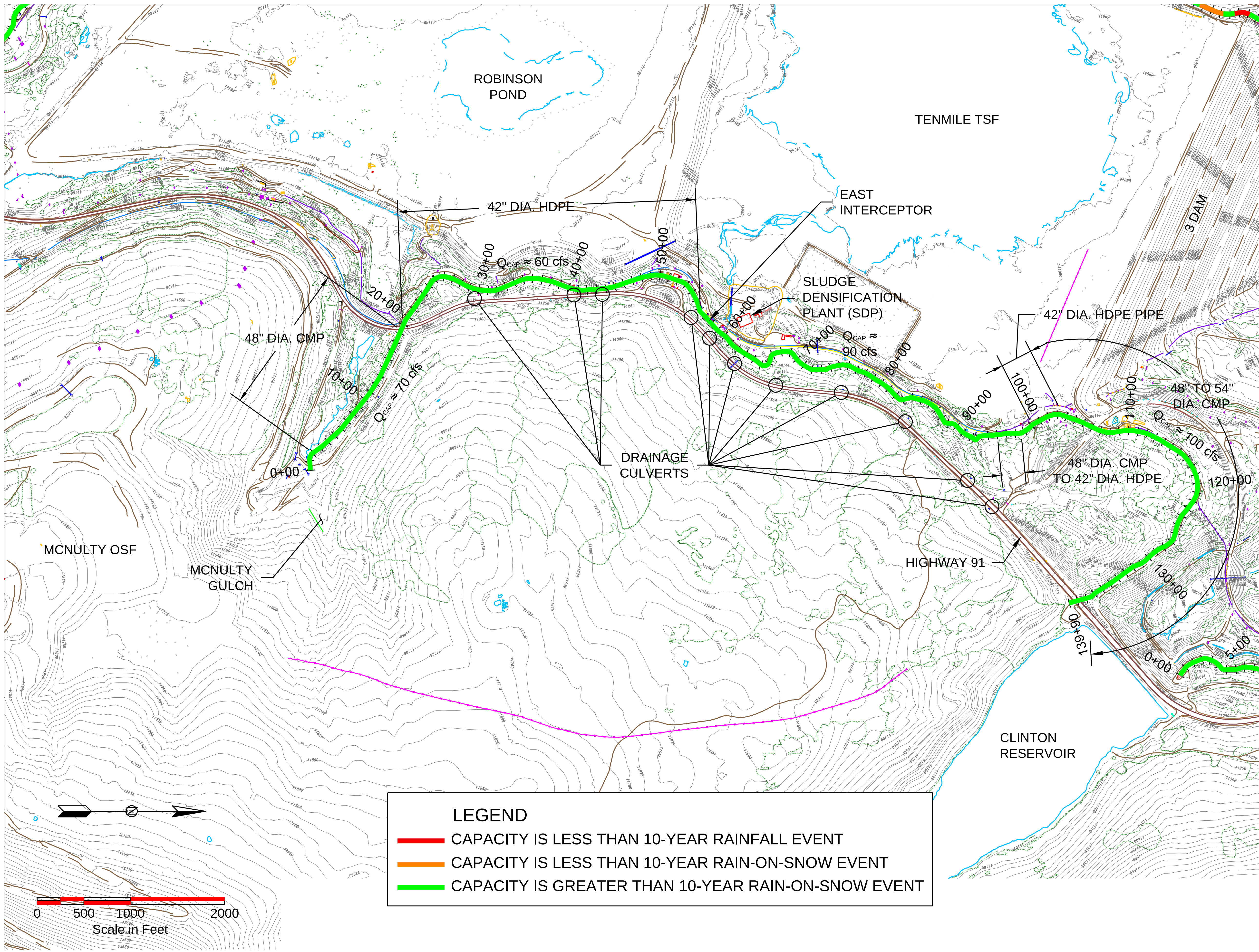


LEGEND
CAPACITY IS LESS THAN 10-YEAR RAINFALL EVENT
CAPACITY IS LESS THAN 10-YEAR RAIN-ON-SNOW EVENT
CAPACITY IS GREATER THAN 10-YEAR RAIN-ON-SNOW EVENT
0 500 1000 2000
Scale in Feet
0+00
10+00
20+00
30+00
40+00
50+00
60+00
70+00
80+00
90+00
100+00
110+00
120+00
130+00
140+00
150+00
160+00
162+00
QCAP ≈ 10 cfs
QCAP ≈ 30 cfs
QCAP ≈ 50 cfs
QCAP ≈ 80 cfs
QCAP ≈ 90 cfs
QCAP ≈ 100 cfs
48" DIA. CMP
36" DIA. CMP
42" DIA. HDPE PIPE
42" DIA. HDPE
CHALK MOUNTAIN INTERCEPTOR
CHALK MOUNTAIN RESERVOIR
ROBINSON LAKE
ROBINSON DAM SEEPWATER POND
1 DAM
BUFFEHRS LAKE
MILL AREA
ROBINSON POND
W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers
December 2013
Climax Mine
Chalk Mountain Interceptor
Plan View
Job Number
1051.27
Figure 5



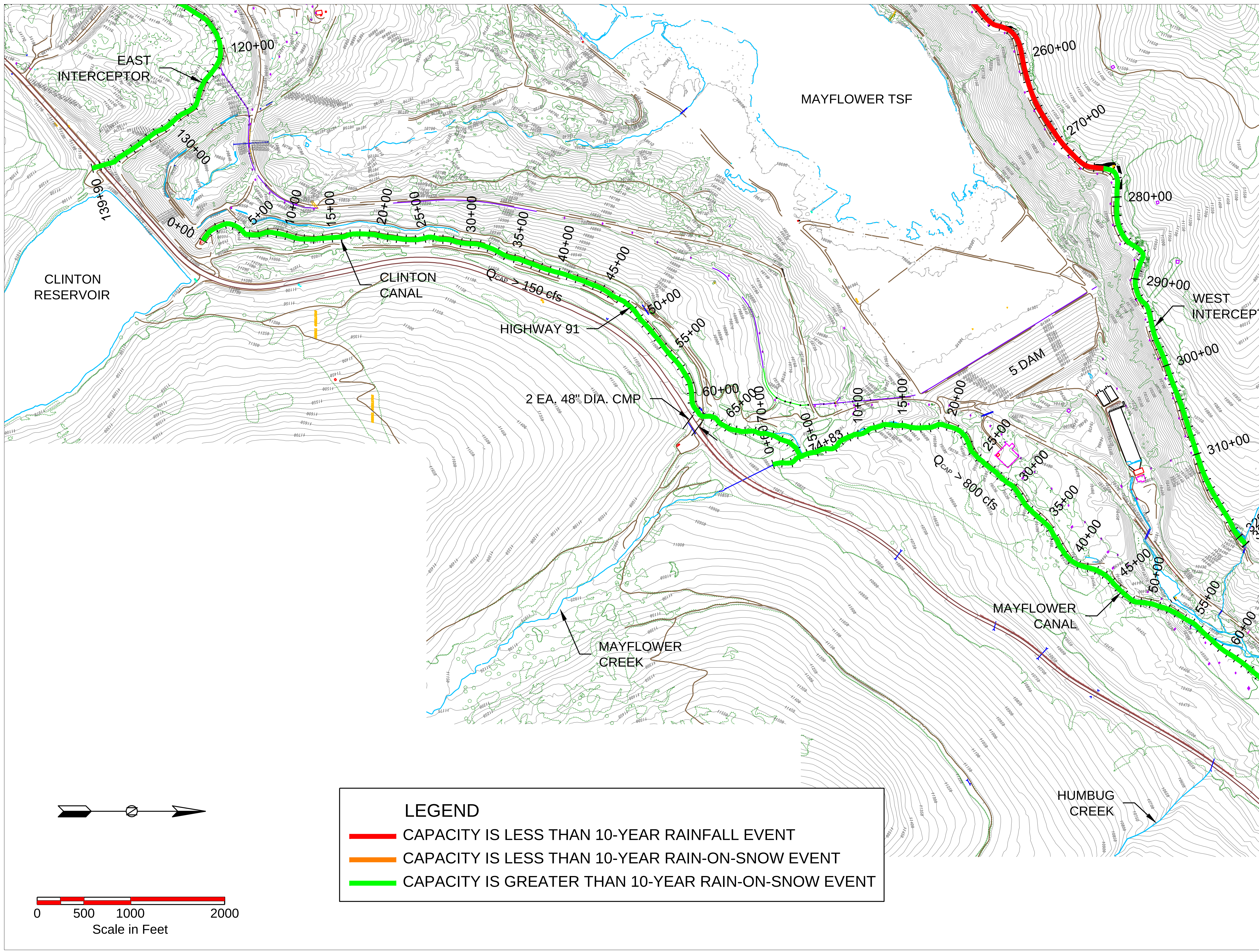
December 2013

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

Climax Mine
East Interceptor
Plan View - Start to Clinton Reservoir

Job Number
1051.27.02

Figure 6a



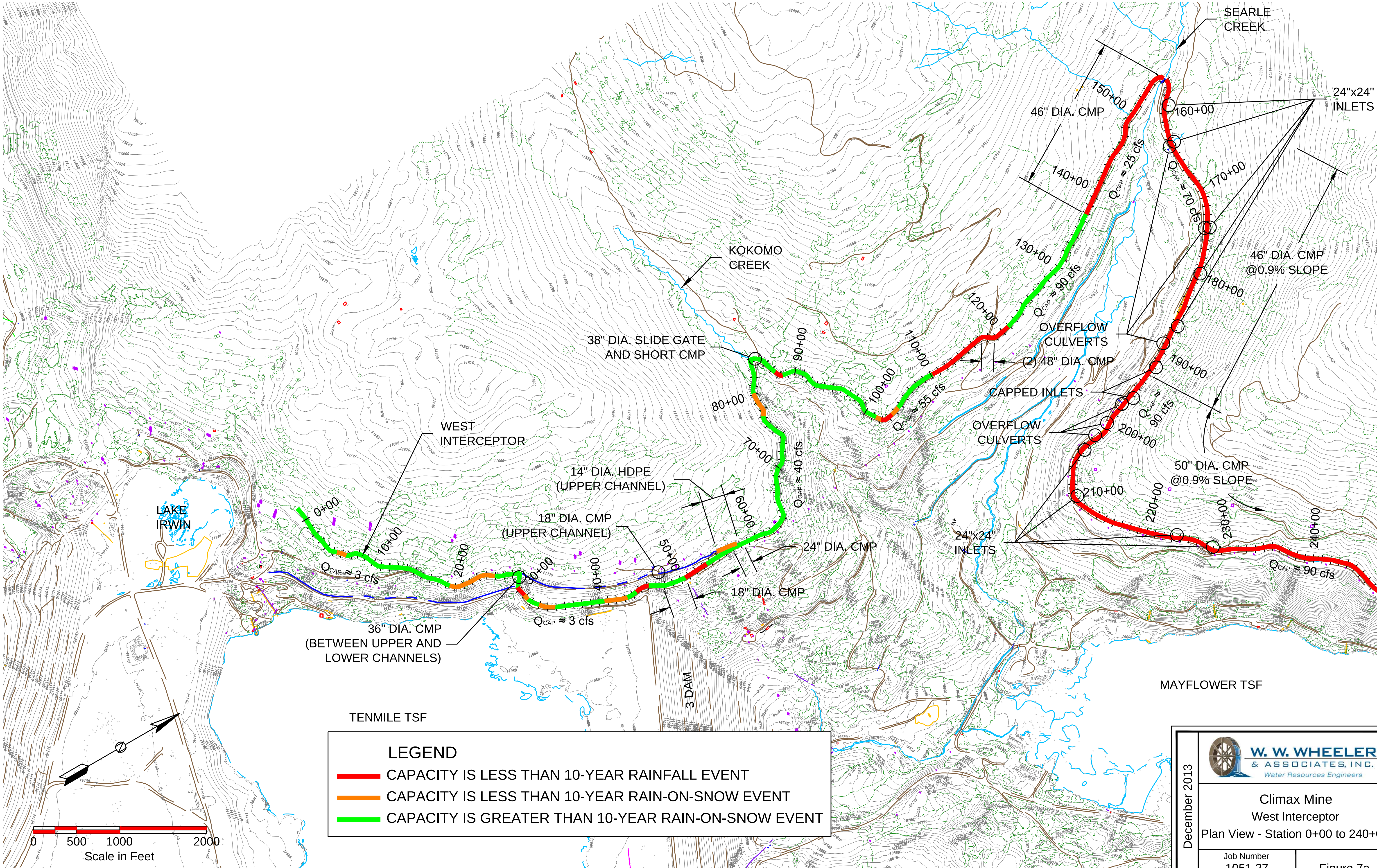
December 2013

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

Climax Mine
East Interceptor
Plan View - Clinton Reservoir to End

Job Number
1051.27

Figure 6b



LEGEND

- CAPACITY IS LESS THAN 10-YEAR RAINFALL EVENT
- CAPACITY IS LESS THAN 10-YEAR RAIN-ON-SNOW EVENT
- CAPACITY IS GREATER THAN 10-YEAR RAIN-ON-SNOW EVENT

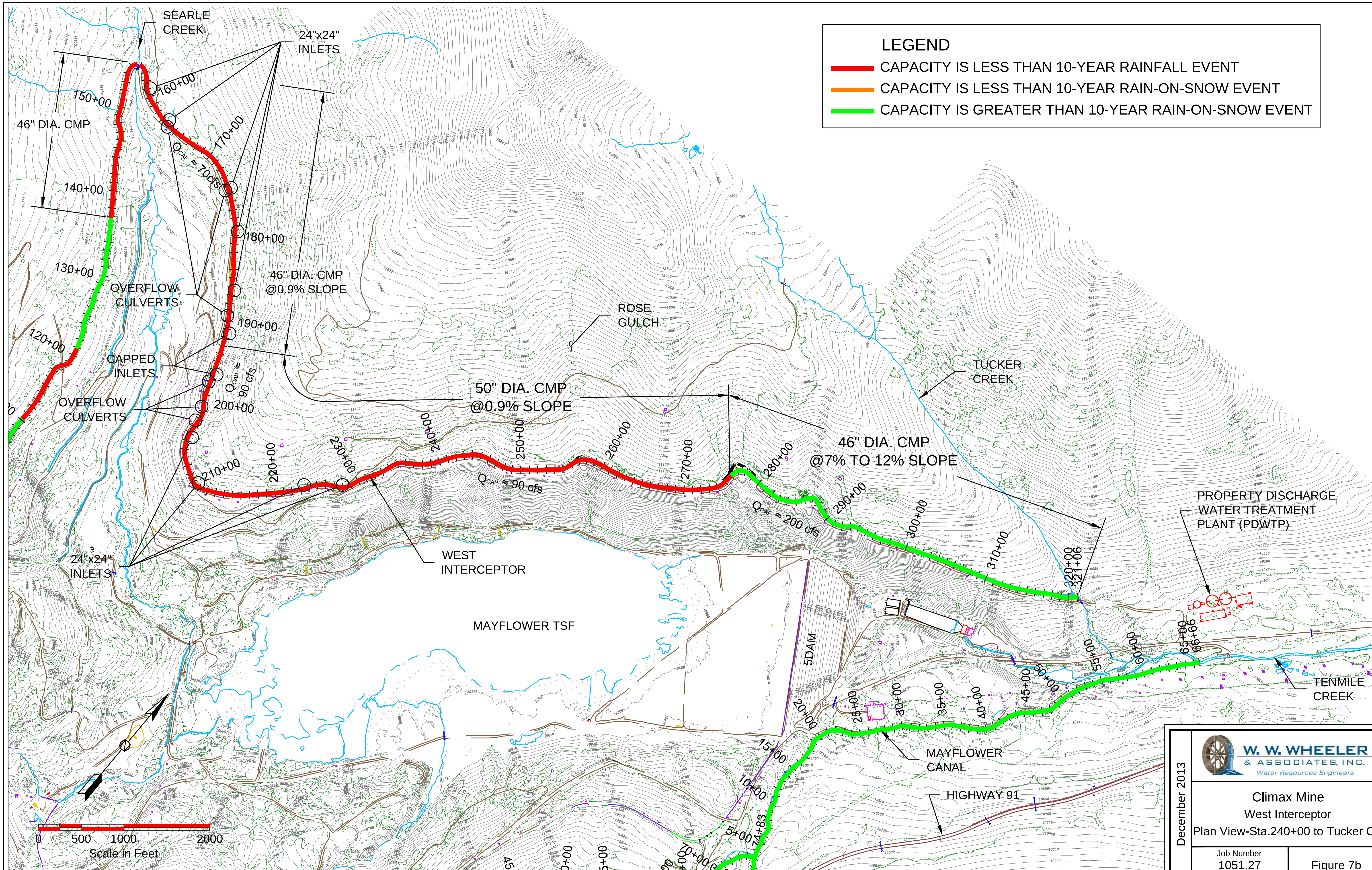
W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

December 2013

Climax Mine
West Interceptor
Plan View - Station 0+00 to 240+00

Job Number
1051.27

Figure 7a


LEGEND
CAPACITY IS LESS THAN 10-YEAR RAINFALL EVENT
CAPACITY IS LESS THAN 10-YEAR RAIN-ON-SNOW EVENT
CAPACITY IS GREATER THAN 10-YEAR RAIN-ON-SNOW EVENT
SEARLE CREEK
24"x24" INLETS
46" DIA. CMP
OVERFLOW CULVERTS
CAPPED INLETS
OVERFLOW CULVERTS
46" DIA. CMP @0.9% SLOPE
ROSE GULCH
50" DIA. CMP @0.9% SLOPE
46" DIA. CMP @7% TO 12% SLOPE
TUCKER CREEK
PROPERTY DISCHARGE WATER TREATMENT PLANT (PDWTP)
Q_{CAP} ≈ 70cfs
Q_{CAP} ≈ 90 cfs
Q_{CAP} ≈ 90 cfs
Q_{CAP} ≈ 200 cfs
24"x24" INLETS
WEST INTERCEPTOR
MAYFLOWER TSF
5DAM
MAYFLOWER CANAL
HIGHWAY 91
TENMILE CREEK
120+00
130+00
140+00
150+00
160+00
170+00
180+00
190+00
200+00
210+00
220+00
230+00
240+00
250+00
260+00
270+00
280+00
290+00
300+00
310+00
320+00
321+06
0
500
1000
2000
Scale in Feet
W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers
December 2013
Climax Mine
West Interceptor
Plan View-Sta.240+00 to Tucker Cr.
Job Number
1051.27
Figure 7b