SECTION 26

DRAINAGE CONTROL PLAN

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SECTION 26

DRAINAGE CONTROL PLAN

LIST OF TABLES

TABLE NUMBER	TABLE TITLE
26.2-1	Drainage Control Structures

SECTION 26

DRAINAGE CONTROL PLAN

LIST OF EXHIBITS

EXHIBIT NUMBER	EXHIBIT TITLE
26.1-1	Location Map - Drainage Control Plan – Drainage Control Structures and Watersheds
26.3-1	Pond 501 Design Plan, Profile, and Typical
26.3-2	Pond 502 Design Plan, Profile, and Typical
26.3-3	Pond 503 Design Plan, Profile, and Typical

SECTION 26

DRAINAGE CONTROL PLAN

LIST OF APPENDICES

APPENDIX NUMBER	APPENDIX TITLE
26.A	Pinabete Diversion and East Diversion Design
26.B	Pond Embankment Slope Stability Evaluation
26.C	Pond 501 SEDCAD Analysis
26.D	Pond 502 SEDCAD Analysis
26.E	Pond 503 SEDCAD Analysis

SECTION 26

DRAINAGE CONTROL PLAN

LIST OF REVISIONS DURING PERMIT TERM

REV. NUMBER	REVISION DESCRIPTION	DATE APPROVED

SECTION 26 DRAINAGE CONTROL PLAN

Drainage control structures will be designed to meet the applicable performance standards of 30 CFR Subchapter K and the Mine Safety and Health Administration (MSHA) standards and requirements for impoundments.

26.1 Drainage Control Watersheds

The watersheds for drainage control structures were delineated using aerial mapping on 10-ft contours inside the permit area and U.S. Geologic Survey (USGS) quadrangle sheets on 10- or 20-ft contours outside the permit area. The watersheds are presented on Exhibit 26.1-1. The curve numbers were determined using data from a detailed soil survey, presented in Section 14 (Soil) conducted inside the permit area and data from the Natural Resources Conservation Service (NRCS) soil surveys, *Soil Survey of San Juan County New Mexico, Eastern Part* (Keetch 1980) for areas outside the permit area. The soil mapping units were classified into four groups based on the surface texture; fine, fine loamy, coarse loamy, and sandy. The four groups have a combination of different hydrologic groups: fine 100% hydrologic group D; fine loamy 3.9% hydrologic group B and 96.1% hydrologic group D; coarse loamy 65.4% hydrologic group B, 18.6% hydrologic group C, and 16.0% hydrologic group D; sandy 96.0% hydrologic group A, 3.5% hydrologic group B, and 0.5% hydrologic group D. The curve numbers assigned to the hydrologic groups are: A 65, B 78, C 87, and D 93. Using this data, a weighted curve number was determined for each soil texture group. The weighted curve numbers for the four soil texture groups are: fine 93, fine loamy 92.4, coarse loamy 81.9, and sandy 65.6. Using this data, a weighted curve number was calculated for the watersheds.

26.2 Drainage Control Structures

The locations of the drainage control structures and their associated watersheds are presented on Exhibit 26.1-1. Table 26.2-1 identifies each structure and provides references for locating the supporting design data, design drawing, and the as-built drawing. The data referenced in the table for each respective structure provide the information required for demonstrating that the structures comply with applicable performance standards of 30 CFR Subchapter K and MSHA standards and requirements.

26.2.1 Existing Drainage Control Structures

No existing drainage structures will be utilized to facilitate the mining and reclamation operations.

26.2.2 Impoundments and Siltation Structures General Plans

There will be no general plans for impoundments and siltation structures; a site-specific design will be developed for each structure.

26.3 Drainage Control Structures Design Plans

26.3.1 Perennial and Intermittent Stream Diversions Design Plans

The Pinabete Arroyo, an intermittent stream, will be diverted into the No Name Arroyo to facilitate mining in the No Name Permit (NNP). The tributary flows to Pinabete Arroyo crossing the eastern lease boundary will also be diverted to the No Name Arroyo. The East Diversion will collect the flows along the eastern lease boundary and convey them to the Pinabete Diversion. Refer to Exhibit 26.1-1 for location of the diversions.

All perennial and intermittent stream diversions will meet the applicable performance standards described in 30 CFR Subchapter K and, in particular, §816.43. The Pinabete Diversion and the East Diversion have been designed to safely accommodate the expected flows from a 100yr-6hr storm event consistent with the Office of Surface Mining Reclamation and Enforcement (OSM) design requirements for permanent diversions. Appendix 26.A provides detailed designs for the Pinabete Diversion and the East Diversion, including the methods and plans for stockpiling suitable topdressing and diversion excavation materials that will be needed for reclamation of the diversion. Appendix 26.A also includes; a drainage, erosion, and sediment control plan for the diversion; an assessment of the probable hydrologic consequences (PHC) of the diversion and plans to mitigate adverse impacts; professional engineer- certified drawings of the proposed diversion; storm water controls; and impact mitigation designs.

26.3.1.1 Pinabete Diversion

The NNP area extends across 20.3 sq mi and is crossed by two arroyos: Pinabete Arroyo and No Name Arroyo. Both Pinabete and No Name Arroyo flow from southeast to northwest to the Chaco River, which is located west of the NNP. The Chaco River flows from south to north to a confluence with the San Juan River. The total drainage basin areas for Pinabete Arroyo and No Name Arroyo are 60.3 and 11.5 sq mi, respectively. Most of the drainage areas for both arroyos are located within or upgradient of the NNP area as shown in Figure 26.A-1 of Appendix 26.A. The drainage area of Pinabete Arroyo, where it exits the NNP area on the west, is 55.5 sq mi, while the drainage area of No Name, where it exits the NNP area on the west, is 8.8 sq mi. No Name Arroyo will not be disturbed by mining under the proposed mine plan. However, the mine plan involves mining through the segment of Pinabete Arroyo that crosses Area 4 South. This requires that the ephemeral stream flow in Pinabete Arroyo from the 43.9 sq mi drainage area located east of NNP be diverted around the proposed mining operations. Although the Pinabete Arroyo channel within the permit area will be reestablished in accordance with the Reclamation Plan in Part 5 of this permit application package, the Pinabete Diversion will be required until completion of mining and reclamation activities within Area 4 South. Given the mining and topographic constraints, the only viable option for diverting Pinabete Arroyo is through the proposed diversion channel located along the south side of Area 4 South into No Name Arroyo as shown in Figure 26.A-1 of Appendix 26.A.

26.3.1.2 East Diversion

Associated with the Pinabete Diversion is a diversion ditch (East Diversion) to be located on the east side of NNP. The East Diversion will divert surface water from drainages upgradient and east of Area 4 South that would otherwise flow into the proposed mining area as shown in Exhibit 26.A-1 of Appendix 26.A.

26.3.2 Miscellaneous Flow Diversions Design Plans

All miscellaneous flow diversions will meet the applicable performance standards described in 30 CFR Subchapter K and, in particular, §816.43.

The drainage plan associated with a site-specific design may require miscellaneous flow diversions to control drainage. These structures are an integral part of a site-specific design, thus, their design will be incorporated into the site-specific design package of the diversions that they are associated with.

Miscellaneous flow diversions need a smooth transition to prevent erosion issues. The NRCS (1977), formerly the Soil Conservation Service, has provided some general principles to follow in designing transitions between constructed diversions and native channels. These principles include:

- the water surface should be smoothly transitioned to meet end conditions;
- the water surface edges should not at any section converge at an angle greater than 28^{o} with the center line, nor diverge at an angle greater than 25^{o};
- in wells designed transitions, losses in addition to friction should not exceed $0.10*h_v$ for converges and $0.2*h_v$ for divergence, where h_v is the velocity head;
- in general it is desirable to have bottom grades and side slopes meet end conditions tangentially; and
- channel conjunctions: The natural angle of juncture between tributary streams and main streams has been observed to be in a range of 45 to 55 degrees should provide for reasonable transition and assimilation of diverted flows into stream channels.

For additional diversion design and principles refer to the OSMRE Surface Mining Water Diversion Design Manual (OSMRE 1982 section 7.1-7.6). All miscellaneous flow diversions will be classified as temporary diversions and will be designed to safely pass the peak flow from the 2 year 6 hour (2yr-6hr) storm event or greater. The watershed for the diversion channels was delineated, soil curve numbers determined, and precipitation values for the design storm obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas IV-New Mexico (NOAA 2011). The watersheds and channel or ditch were modeled in SEDCAD to determine the peak flow and the required channel size. If the results from the

hydraulic analysis indicate potential for erosion to occur, riprap rock or other forms of protective lining will be installed.

26.3.3 Sedimentation Ponds

The sediment ponds required to retain the runoff and sediment from a disturbed area will be constructed prior to commencing any type of surface disturbance upstream of the pond. They will be located as close as possible to the upstream area that will be disturbed. Construction of a pond will not commence until the engineering drawings and supporting design data have been reviewed and approved by OSMRE. After completion of construction, an as-built drawing of the pond will be developed and kept on file at the mine site; it will be made available upon request. A registered professional engineer will certify both the design and as-built drawings.

Table 26.2-1 identifies each sediment pond and provides references for locating the supporting design data, design drawing, and the as-built drawing for each pond. The data referenced in the table for each respective pond provides the information required to demonstrate that the ponds comply with 30 CFR Sections 816.46, 816.47, and 816.49. The hazard classification for each pond is also specified on the table. The locations of the ponds are shown on Exhibit 26.1-1.

A site-specific design will be developed for each sediment pond. They will be designed to meet the applicable performance standards of 30 CFR Subchapter K. The design criteria for the sediment ponds will be as follows:

- The design storm will be 10yr-24hr or the 100yr-6hr precipitation event.
- Ponds designed to retain the 10yr-24hr runoff will have a spillway.
- Ponds designed to retain the 100yr-6hr runoff will not have a spillway.
- The spillway will safely pass the peak discharge from the 25yr-6hr storm event.
- The pond is assumed to be full when sizing the spillway.
- The pond will have a 1-ft freeboard with the spillway flowing.
- The design capacity will be less than 20 acre-feet (ac-ft).
- Riprap will be placed at the pond inlets and spillways if hydraulic analysis indicates that a protective lining is required to minimize and control erosion.
- Embankments will have a minimum static safety factor of 1.3.

To minimize risk of embankment failures, ponds will be designed to be incised. Primarily, sediment ponds at NNP will be small ponds located in a rural area and in the event of a failure they will not constitute a hazard to the general public, mine employees, mine equipment, and public transportation or utilities. The potential for loss of life and property damage is very low. They will all be classified as low-hazard-potential dams.

To demonstrate that the pond embankments will have a minimum static safety factor of 1.3, a slope stability analysis has been performed on a worst-case scenario, i.e., maximum embankment height. Because the embankments are to be constructed with similar type soils, a worst-case analysis should be sufficient. The slope stability analysis is presented in Appendix 26.B.

To ensure that the design storm runoff volume is maintained, the maximum permissible gauge reading for the water or sediment level is provided. The volume above the maximum permissible water or sediment level is equal to the design storm runoff volume, and the volume below it is the excess volume. If the water or sediment level should exceed the maximum permissible gauge reading, then the impoundment will be either pumped or cleaned out down to an acceptable level. This will ensure that the design storm runoff volume is maintained at all times. The maximum permissible gauge reading for the water or sediment level is provided for each impoundment, except for the sewer ponds, raw water storage ponds, and highwall impoundments. The maximum permissible gauge reading for each pond is provided on Table 26.2-1.

The watershed sizes and curve numbers can change due to areas being mined and reclaimed. This can result in changes in the volume of surface runoff that needs to be retained by the ponds. The supporting hydrology data and the maximum permissible gauge reading will be updated annually to account for these changes.

After a runoff event, 90% of the design capacity will be restored within 10 days, provided the ponds are accessible and it is safe to do so. Weather and ground conditions may limit access to some ponds, particularly those in the reclaimed and undisturbed areas. Accessing these ponds with dewatering equipment during muddy conditions can cause excessive damage to adjacent undisturbed or reclaimed lands. In such a case, dewatering will occur as soon as conditions improve.

Prior to commencing construction of the ponds, the topsoil will be removed and placed in a stockpile. To prevent excessive settlement, the pond will be located on stable ground and the embankment will be adequately compacted. The fill area will be cleared of trees, stumps, roots, boulders, vegetation, and rubbish prior to beginning placement of fill material. The sedimentation pond foundations shall be stable during all phases of construction and operation and shall be designed adequate and accurate information on the foundation conditions. Most sedimentation pond embankments will be classified as low hazard dams. However, should the Navajo Transitional Energy Company (NTEC) construct a sedimentation pond embankment meeting the Class B (significant hazard class) or C (high hazard class) criteria for dams in Natural Resource Conservation Service Technical Release (TR) 60 (NRCS 1985) or the size or other criteria of 30 CFR 77.216(a), NTEC will conduct a foundation investigation, as well as any necessary laboratory testing of foundation material to determine the design requirements for foundation

stability. Only suitable fill material free of debris, organic material, frozen matter, and excessive moisture or dryness will be used to construct the embankments. The fill material will be properly compacted. To keep surface disturbance to a minimum, excavation and placement of fill will be limited to the lines and grades indicated on the design drawings.

Inspection and maintenance will be conducted on a periodic basis to ensure that ponds are functional and in good condition. Inspections will be performed on a quarterly basis; the fourth quarter inspection will be an annual inspection, the results of which will be submitted to OSM. The quarterly inspections will be kept on file at the mine site. Any maintenance items identified from the inspections will be promptly repaired or corrected. Further discussion on the inspection and maintenance of ponds is provided in Section 42 Monitoring, Maintenance, Inspections, and Examinations.

26.3.4 Siltation Structures Design Plans

Currently there is no plan to construct any siltation structures that do not impound water. Should the need arise in the future; this section will be revised accordingly.

26.3.5 Impoundments Design Plans

There will be no typical design or general plans for impoundments; a site-specific design will be developed of each impoundment.

26.3.5.1 Highwall Impoundments

When the mining pit is advancing in the upstream direction this may create a need to construct highwall impoundments to minimize the inflows into the pit and the immediate mining area (IMA). Impoundments will be located upstream of the IMA on the highwall side of the pit. The primary intent is to retain all or a portion of the smaller intensity but more frequently occurring precipitation events, thereby enhancing the safety of work areas in the IMA (e.g., topsoil removal, truck/loader operation, blasting, and mining operations).

These highwall impoundments, although not intended to comply with surface runoff standards, will retain some sediment. In the event of a discharge or failure, the water released along with any sediment generated will be retained in the pit downstream. Discharges from these impoundments will not leave the permit area. Discharge through the spillways would be very infrequent, since the annual rainfall for the area is approximately 6 in and generates infrequent surface runoff. These impoundments would be dry and empty a majority of the time.

The design criteria for highwall impoundments may be as follows, but not limited to:

- They will not be designed for a specific storm event but will be capable of retaining the more frequently occurring storm events, i.e., between the 2yr-6hr and 5yr-6hr storm event.
- The spillway will safely pass the peak discharge from the 25yr-6hr storm event.
- The impoundment is assumed to be full when sizing the spillway.
- The impoundment will have a 1-ft freeboard with the spillway flowing.
- The design specifications will not exceed MSHA criteria.
- A protective lining may be installed in the spillway if the hydraulic analysis indicates that it is required to control erosion.
- Embankments will have a minimum static safety factor of 1.3 (see Appendix 26.B).

Highwall impoundments will be small impoundments located in a rural area and in the event of a failure they will not constitute a hazard to the general public, mine employees, mine equipment, and public transportation or utilities. The potential for loss of life and property damage is very low. They will all be classified as low-hazard-potential dams. The design specification will not exceed MSHA criteria.

Prior to commencing construction of the pond, the topsoil will be removed and placed in a stockpile. To prevent excessive settlement, the impoundment will be located on stable ground and the embankment will be adequately compacted. The fill area will be cleared of trees, stumps, roots, boulders, vegetation, and rubbish prior to beginning placement of fill material. The highwall impoundment foundations shall be stable during all phases of construction and operation and shall be designed adequate and accurate information on the foundation conditions. Most highwall impoundment embankments will be classified as low hazard dams. However, should NTEC construct a highwall impoundment embankment meeting the Class B (significant hazard class) or C (high hazard class) criteria for dams in Natural Resource Conservation Service Technical Release (TR) 60 (NRCS 1985) or the size or other criteria of 30 CFR 77.216(a), NTEC will conduct a foundation investigation, as well as any necessary laboratory testing of foundation material to determine the design requirements for foundation stability. Only suitable fill material free of debris, organic material, frozen matter, and excessive moisture or dryness will be used to construct the embankments. The fill material will be properly compacted. To keep surface disturbance to a minimum, excavation and placement of fill will be limited to the lines and grades indicated on design drawings.

Inspection and maintenance will be conducted on a periodic basis to ensure that impoundments are functional and in good condition. Inspections will be performed on a quarterly basis; the fourth quarter inspection will be an annual inspection, the results of which will be submitted to OSMRE. The quarterly inspections will be kept on file at the mine site. Any maintenance items identified from the inspections will be promptly repaired or corrected. Further discussion on the inspection and maintenance of high wall impoundments is provided in Section 42 (Monitoring, Maintenance, Inspections, and Examinations).

26.3.6 Other Drainage Control Structures Design Plans

Refer to Section 25 (Sediment Control Plan) for diversion berms and other structures or methods utilized to control drainage, erosion, and sediment.

26.4 Discharges to Underground Mines

There will be no discharge of water, coal mine waste, coal combustion by-products, or other wastes into underground mine workings.

26.5 Information Collection and Analysis

Certified exhibits for Section 26 are available for review upon request at the Navajo Mine office.

References

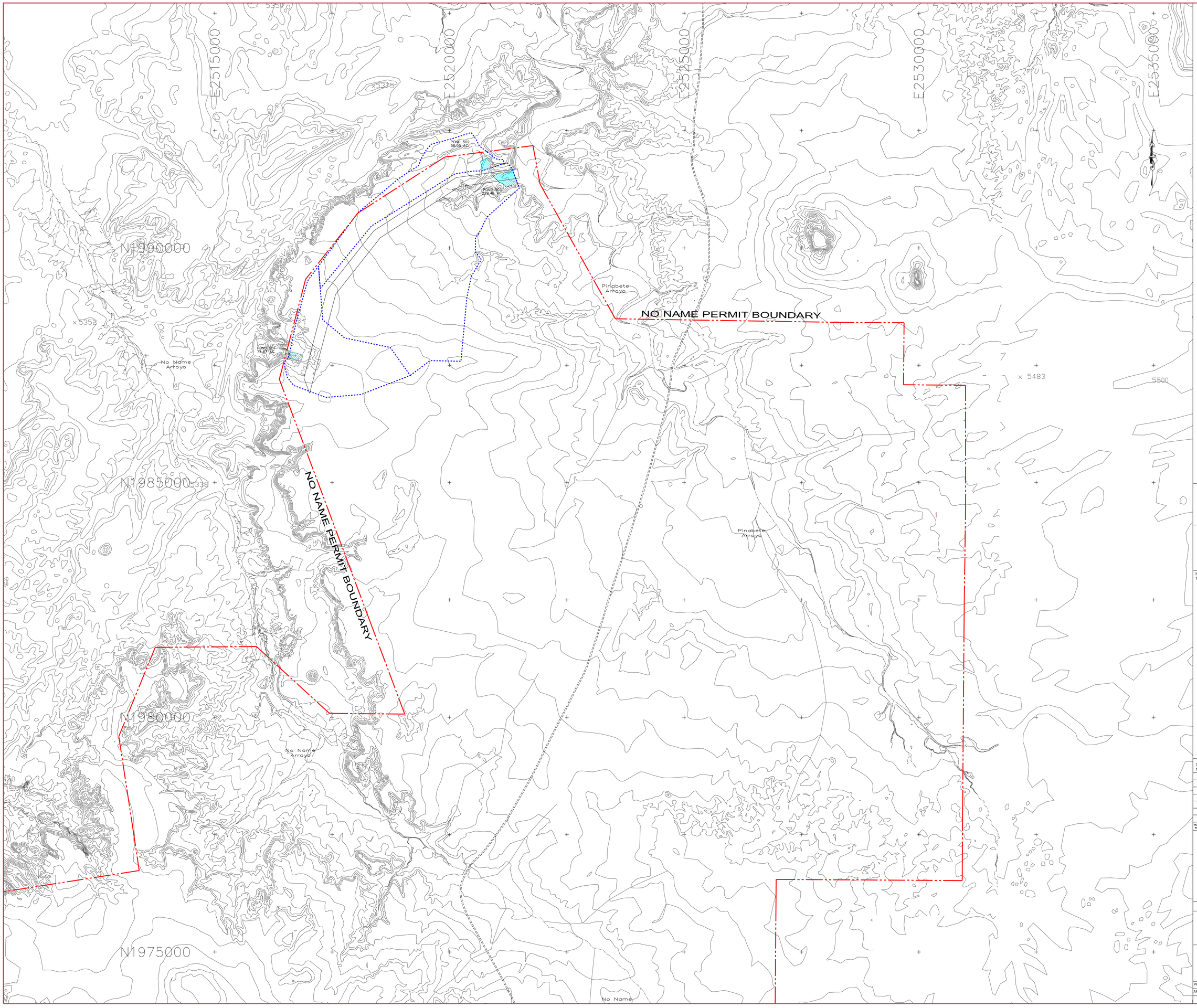
Keetch, C. Wesley. 1980. Soil Survey of San Juan County, New Mexico, Eastern Part. U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C.

NOAA. 2011. Precipitation-Frequency Atlas of the United States. Volume 1, Version 5.0: Semiarid Southwest (Arizona, Southeast California, Nevada, New Mexico, Utah). NOAA Atlas 14. U.S. Department of Commerce, Washington D.C.

Table 26.2-1 Drainage Control Structures

Structure type	Structure identification	Hazard class	Maximum permissible gauge reading	Purpose	Design and as-built data	Const. date	Removal or recl. date	Reclamation plan
Sediment pond	Pond 501	Low	TBD	Retains runoff and sediment from disturbed area	Section 26.3.3.1, Exhibit 26.3-1, and Appendix 26.C	TBD	TBD	Section 35.1
Sediment pond	Pond 502	Low	TBD	Retains runoff and sediment from disturbed area	Section 26.3.3.1, Exhibit 26.3-2, and Appendix 26.D	TBD	TBD	Section 35.1
Sediment pond	Pond 503	Low	TBD	Retains runoff and sediment from disturbed area	Section 26.3.3.1, Exhibit 26.3-3, and Appendix 26.E	TBD	TBD	Section 35.1

1. For watershed identification refer to Table 26.1-1.



LEGEND

- PAVED ROAD
- DIRT ROAD
- HAUL ROAD
- BUILDING
- CULVERT
- RAILROAD
- × 5338.5 — SPOT ELEVATION
- 5300 — INDEX CONTOUR
- INTERMEDIATE CONTOUR
- 218 / 5422.45 — HORIZ. & VERT. CONTROL
- PERMIT BOUNDARY
- WATERSHED BOUNDARY
- MONITORING WELLS
- POND LOCATION

600 0 600 1200

CONTOUR INTERVAL: 10'

Topo Revised by

Aero-Graphics, Inc.

2930 South West Temple
Salt Lake City, Utah 84115

Notes:

1. The hydrology and supporting design data for the drainage control structures are referenced on Table 26.2-1 of the NNP PAP.

Original certified signed exhibits are maintained at the mine site and at OSM.

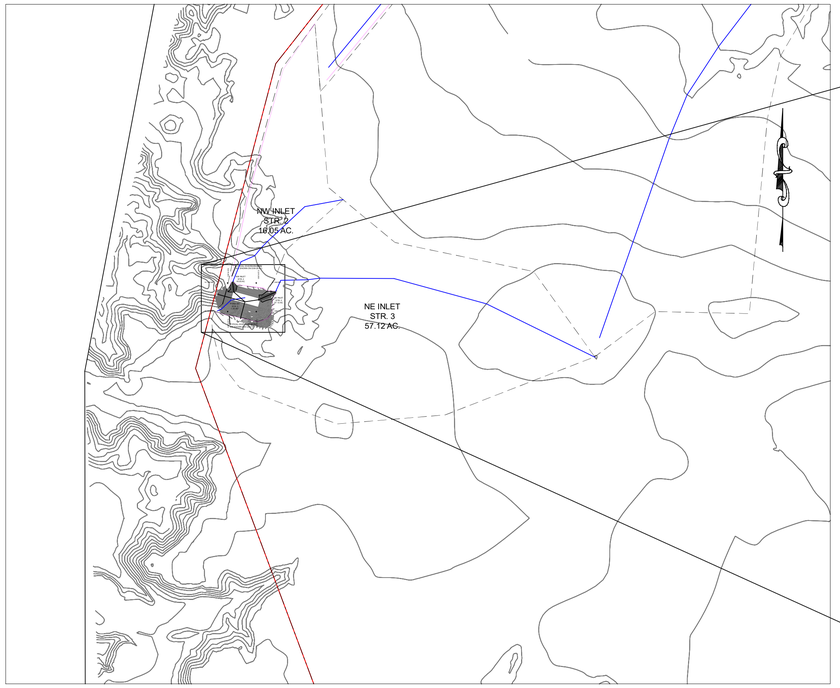
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EXHIBIT 26.1-1

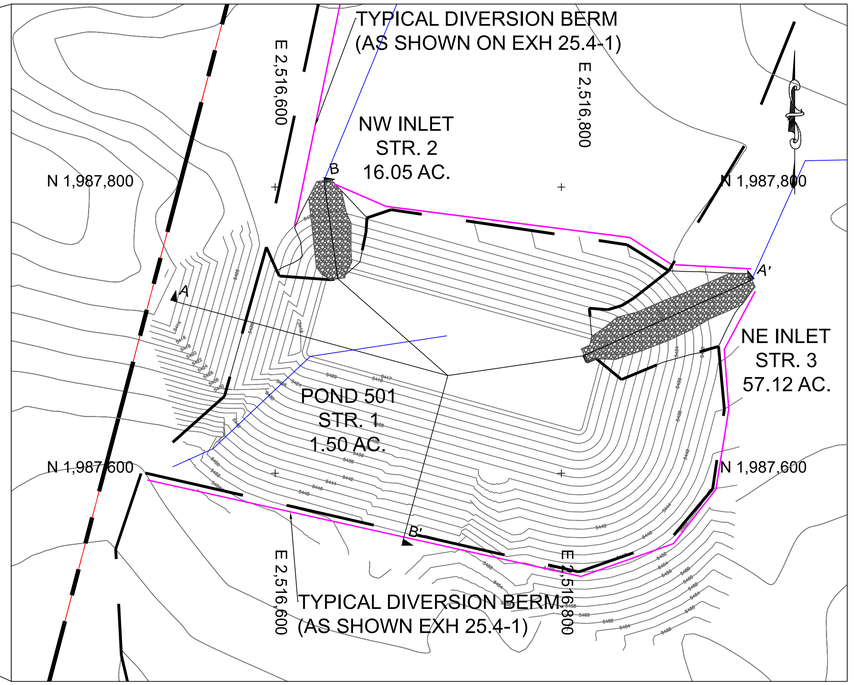
Navajo Transitional Energy Company

LOCATION MAP
DRAINAGE CONTROL PLAN
DRAINAGE CONTROL STRUCTURES AND WATERSHEDS

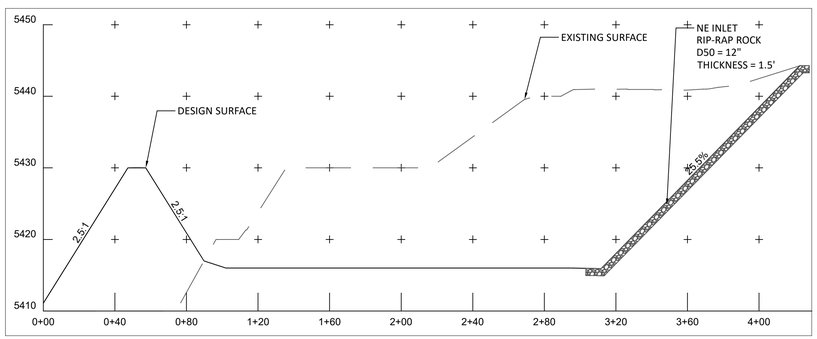
PREPARED BY RY	DRAWN BY RY	SCALE: 1" =600'
APPROVED BY	DATE 9/8/25	



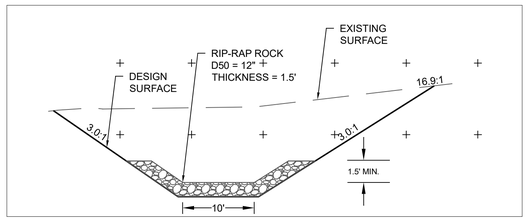
PLAN VIEW
SCALE 1" = 500'



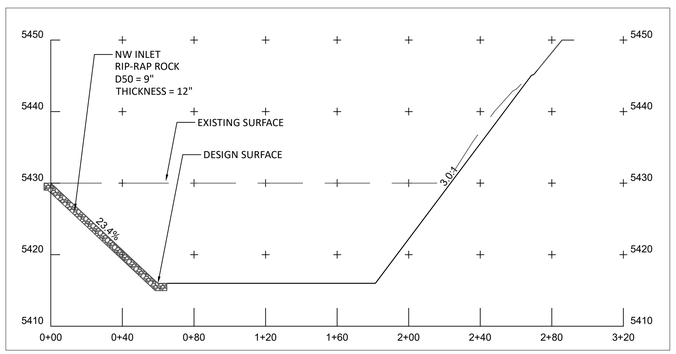
PLAN VIEW
SCALE 1" = 100'



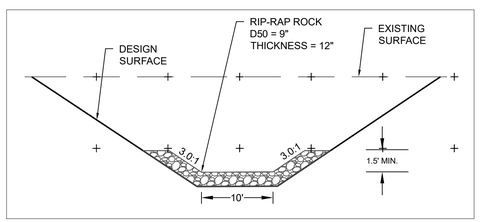
SECTION A-A' : NE INLET
H.SCALE 1" = 40' V. SCALE 1" = 10'



TYPICAL SECTION : NE INLET
NTS



SECTION B-B' : NW INLET
H.SCALE 1" = 40' V. SCALE 1" = 10'



TYPICAL SECTION: NE INLET
NTS

DESIGN DATA:

• TOTAL WATERSHED AREA:	76.67 AC.
• DESIGN STORM:	
•• CONTAINMENT	100-YR, 6-HR; 1.99"
• CURVE NUMBER (RECLAIMED SOILS):	89
• REQUIRED CAPACITY:	5.43 AC-FT
• CAPACITY PROVIDED AT TOP:	7.9 AC-FT
• CAPACITY BELOW 1' FREEBOARD:	7.02 AC-FT
• AVAILABLE SEDIMENT STORAGE:	1.59 AC-FT
• CLEAN-OUT ELEVATION:	5420.51

STAGE STORAGE
Pond 501

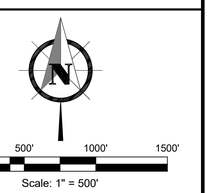
Elev. (ft)	AREA (AC)	Inc Volume (AC-FT)	Accum Volume (AC-FT)	Comments
5416	0.01	0.00	0.00	Botton of Pond
5417	0.30	0.28	0.28	
5418	0.34	0.32	0.60	
5419	0.38	0.36	0.96	
5420	0.42	0.40	1.36	
5421	0.47	0.45	1.81	
5422	0.51	0.48	2.29	
5423	0.55	0.54	2.83	
5424	0.60	0.57	3.40	
5425	0.65	0.63	4.03	
5426	0.70	0.67	4.70	
5427	0.75	0.72	5.42	
5428	0.80	0.77	6.19	
5429	0.85	0.83	7.02	Capacity at 1' Freeboard
5430	0.91	0.88	7.9	Top of Embankment

Certification Statement
I, Ramsey Yazzie, hereby certify that this drawing was reviewed by me and that the information shown is complete and accurate to the best of my knowledge.

RAMSEY R. YAZZIE
NEW MEXICO
23571
PROFESSIONAL ENGINEER

LEGEND

- RAILROAD
- INDEX CONTOUR (5300)
- INTERMEDIATE CONTOUR
- LEASE CORNER (218 5422.45 L-30)
- LEASE/PERMIT BOUNDARY
- WATERSHED AREA
- TYPICAL DIVERSION BERM



Scale: 1" = 500'

NOTES:

1. FOR HYDROLOGY AND DESIGN INFORMATION REFER TO APPENDIX 26.A.
2. THE WATERSHED AREA FOR CULVERTS ARE SHOWN ON EXHIBIT 26.1-1.
3. ADDITIONAL MINE STRUCTURES, INCLUDING ROADS, RAILROAD, PONDS, IMPOUNDMENTS AND CULVERTS, ALTHOUGH PRESENT ON THIS EXHIBIT AS PART OF AERIAL BASE MAPPING, ARE NOT INTENDED TO BE CURRENT OR ACCURATE ON THIS EXHIBIT.
4. PLEASE REFER TO THE APPROPRIATE P.A.P. TEXT SECTION FOR A MINE STRUCTURE EXHIBIT REFERENCE.

DATE	BY	REVISION DESCRIPTION	ENG	R.O.	P.E.
8/30/25	RY	SUBMITTED TO OSM FOR APPROVAL	RY	TH	RY

APPROVALS

EXHIBIT 26.3-1

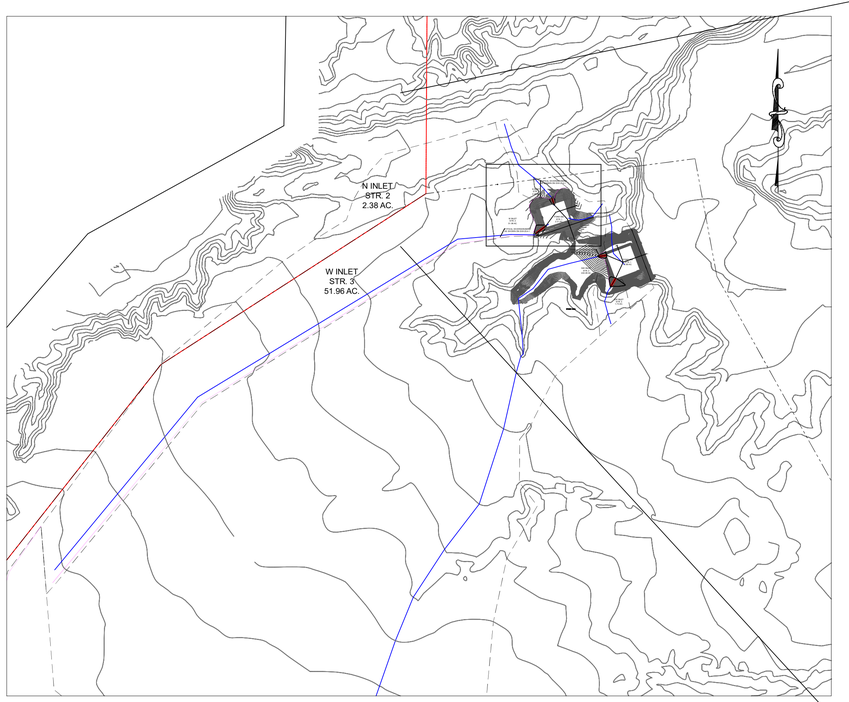
Navajo Transitional Energy Company

Navajo Mine

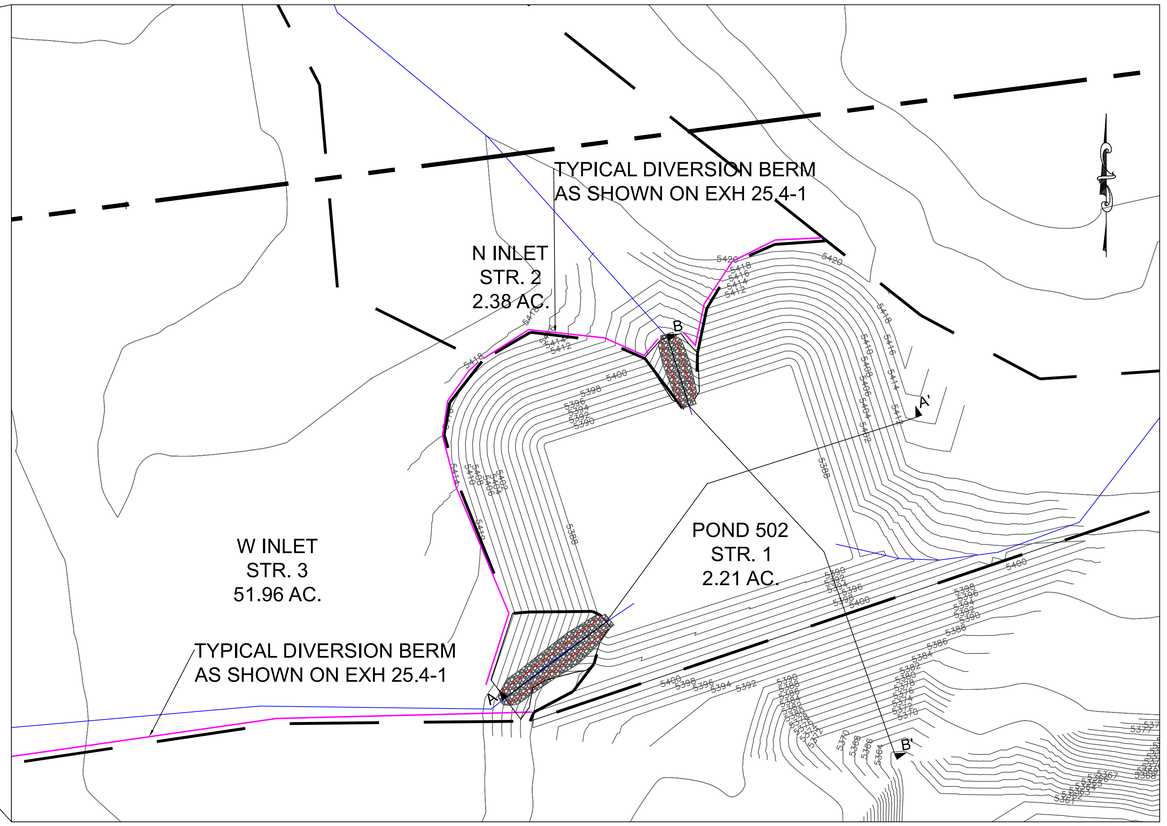
POND 501
PLAN, PROFILE, AND SECTION

Prepared By:	Drawn By: CS	Scale:
Approved By: SS	Plot Date: 07/30/2021	

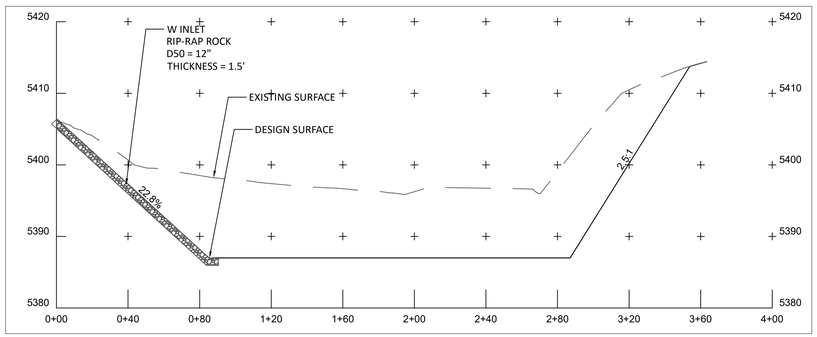
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Drawing: No Name Ponds_080825.dwg



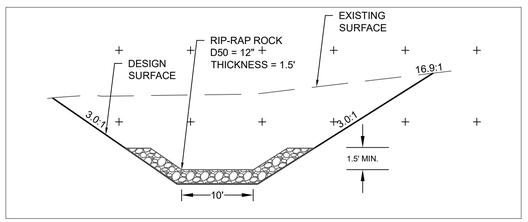
PLAN VIEW
SCALE 1" = 500'



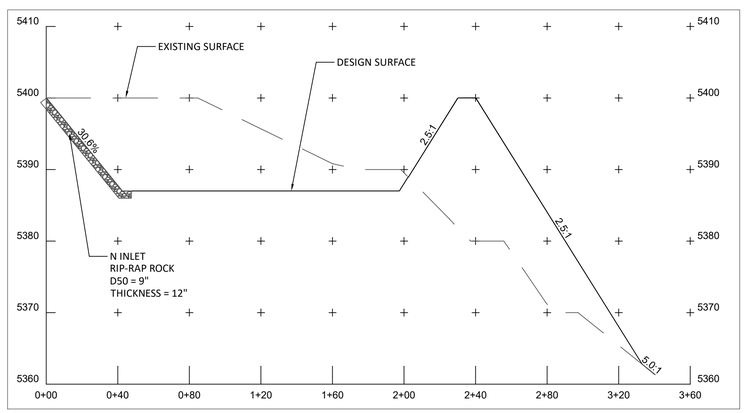
PLAN VIEW
SCALE 1" = 50'



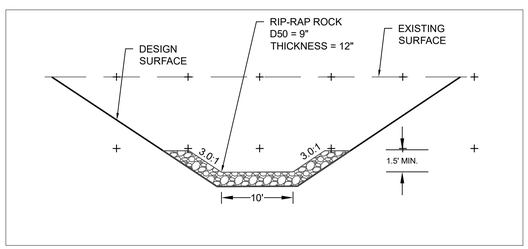
SECTION A-A' : W INLET
H.SCALE 1" = 40' V. SCALE 1" = 10'



TYPICAL SECTION: W INLET
NTS



SECTION B-B' : N INLET
H.SCALE 1" = 40' V. SCALE 1" = 10'



TYPICAL SECTION: N INLET
NTS

DESIGN DATA:

• TOTAL WATERSHED AREA:	56.55 AC.
• DESIGN STORM:	
•• CONTAINMENT	100-YR, 6-HR; 1.99"
• CURVE NUMBER (RECLAIMED SOILS):	89
• REQUIRED CAPACITY:	4.8 AC-FT
• CAPACITY PROVIDED AT TOP:	11.12 AC-FT
• CAPACITY BELOW 1' FREEBOARD:	9.95 AC-FT
• AVAILABLE SEDIMENT STORAGE:	5.15 AC-FT
• CLEAN-OUT ELEVATION:	5394.2

STAGE STORAGE
Pond 502

Elev. (ft)	AREA (AC)	Inc Volume (AC-FT)	Accum Volume (AC-FT)	Comments
5387	0.00	0.00	0.00	Botton of Pond
5388	0.60	0.58	0.58	
5389	0.64	0.62	1.20	
5390	0.68	0.66	1.86	
5391	0.73	0.71	2.57	
5392	0.77	0.75	3.32	
5393	0.82	0.80	4.12	
5394	0.87	0.84	4.96	
5395	0.92	0.89	5.85	
5396	0.97	0.94	6.79	
5397	1.02	1.00	7.79	
5398	1.08	1.05	8.84	
5399	1.14	1.11	9.95	Capacity at 1' Freeboard
5400	1.21	1.17	11.12	Top of Embankment

Certification Statement
I, Ramsey Yazzie, hereby certify that this drawing was reviewed by me and that the information shown is complete and accurate to the best of my knowledge.

RAMSEY R. YAZZIE
NEW MEXICO
23571
PROFESSIONAL ENGINEER

LEGEND

- RAILROAD
- 5300 INDEX CONTOUR
- INTERMEDIATE CONTOUR
- 218 5422.45 L-30 LEASE CORNER
- LEASE/PERMIT BOUNDARY
- WATERSHED AREA
- TYPICAL DIVERSION BERM

0' 500' 1000' 1500'
Scale: 1" = 500'

NOTES:

1. FOR HYDROLOGY AND DESIGN INFORMATION REFER TO APPENDIX 26.B.
2. THE WATERSHED AREA FOR CULVERTS ARE SHOWN ON EXHIBIT 26.1-1.
3. ADDITIONAL MINE STRUCTURES, INCLUDING ROADS, RAILROAD, PONDS, IMPOUNDMENTS AND CULVERTS, ALTHOUGH PRESENT ON THIS EXHIBIT AS PART OF AERIAL BASE MAPPING, ARE NOT INTENDED TO BE CURRENT OR ACCURATE ON THIS EXHIBIT.
4. PLEASE REFER TO THE APPROPRIATE P.A.P. TEXT SECTION FOR A MINE STRUCTURE EXHIBIT REFERENCE.

DATE	BY	REVISION DESCRIPTION	APPROVALS
8/30/25	RY	SUBMITTED TO OSM FOR APPROVAL	RY TH RY

EXHIBIT 26.3-2

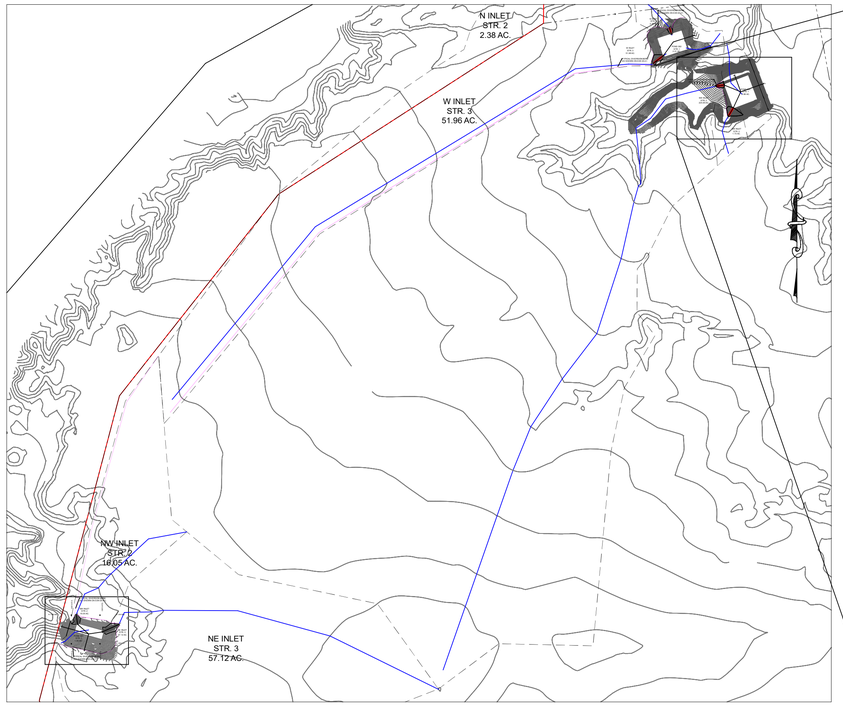
Navajo Transitional Energy Company

Navajo Mine

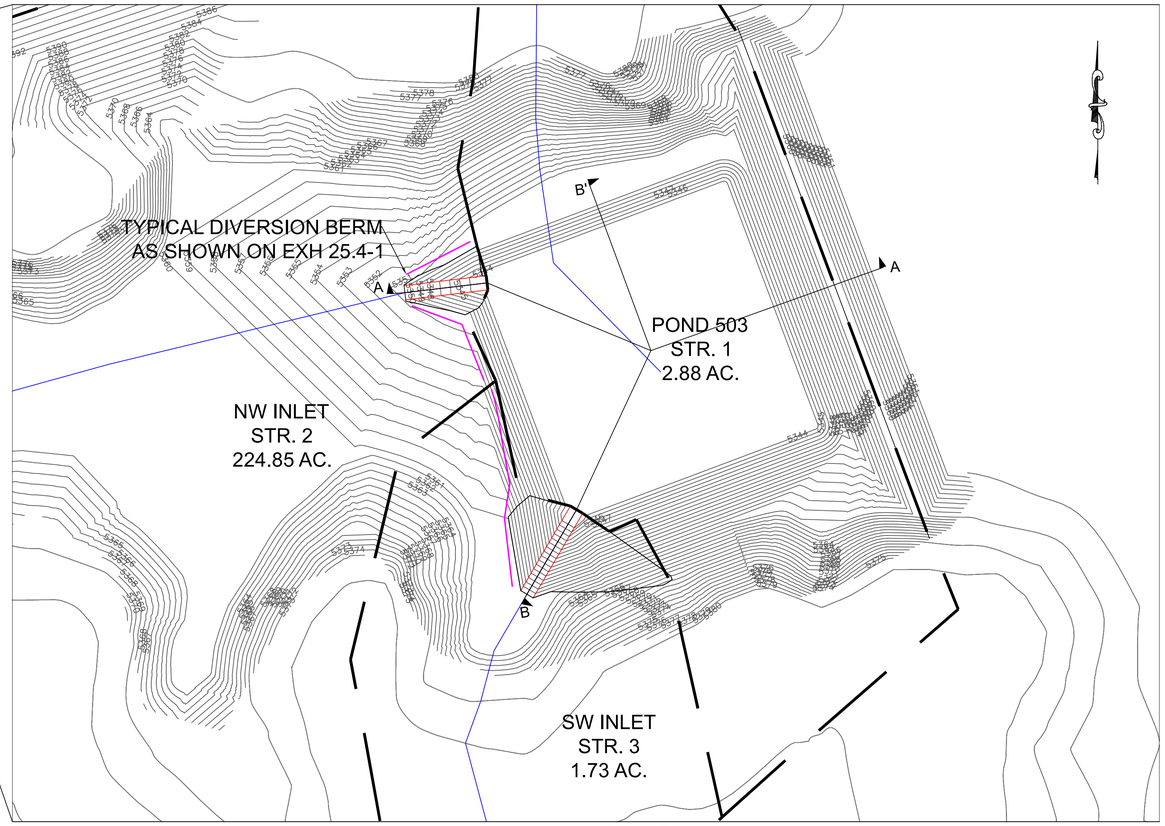
POND 502
PLAN, PROFILE, AND SECTION

Prepared By:	Drawn By: CS	Scale:
Approved By: SS	Plot Date: 07/30/2021	

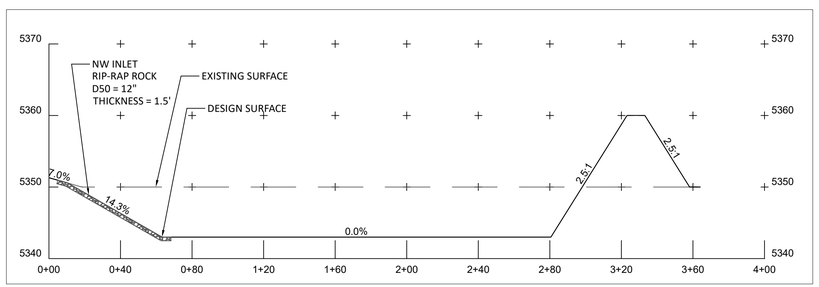
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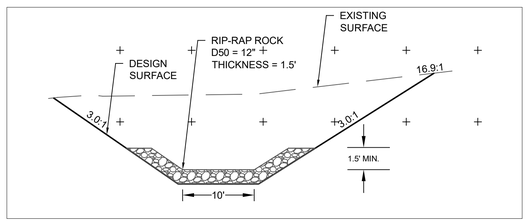
PLAN VIEW
SCALE 1" = 500'



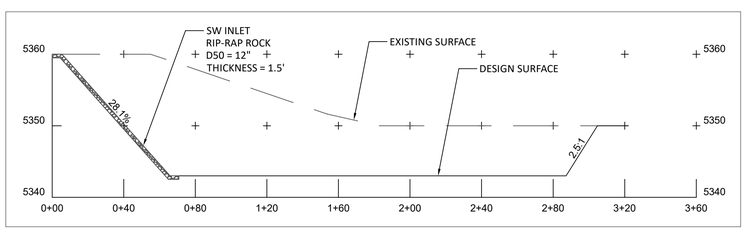
PLAN VIEW
SCALE 1" = 100'



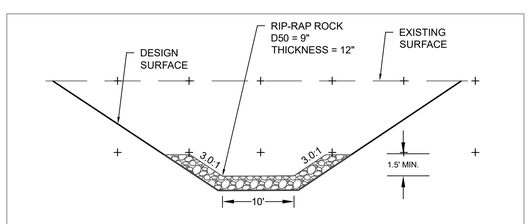
SECTION A-A' : NW INLET
H.SCALE 1" = 40' V. SCALE 1" = 10'



TYPICAL SECTION: NW INLET
NTS



SECTION B-B' : SW INLET
H.SCALE 1" = 40' V. SCALE 1" = 10'



TYPICAL SECTION: SW INLET
NTS

DESIGN DATA:

- TOTAL WATERSHED AREA: 229.46 AC.
- DESIGN STORM:
  - CONTAINMENT 100-YR, 6-HR; 1.99"
- CURVE NUMBER (RECLAIMED SOILS): 89
- REQUIRED CAPACITY: 15.61 AC-FT
- CAPACITY PROVIDED AT TOP: 23.35 AC-FT
- CAPACITY BELOW 1' FREEBOARD: 21.00 AC-FT
- AVAILABLE SEDIMENT STORAGE: 5.39 AC-FT
- CLEAN-OUT ELEVATION: 5349.09'

NOTE: INCISED AT ELEVATION 5350' (UPSTREAM TOE). CAPACITY AT ELEV. 5350 IS 6.35 AC.FT. TOTAL CAPACITY ABOVE UPSTREAM TOE: 23.35 AC-FT - 6.35 AC-FT = 17.00 AC-FT. POND 503 IS NOT AN MSHA POND.

STAGE STORAGE
Pond 503

Elev. (ft)	AREA (AC)	Inc Volume (AC-FT)	Accum Volume (AC-FT)	Comments
5343	0.75	0.00	0.00	Botton of Pond
5344	0.79	0.77	0.77	
5345	0.84	0.81	1.58	
5346	0.88	0.86	2.44	
5347	0.93	0.91	3.35	
5348	0.98	0.95	4.30	
5349	1.03	1.00	5.30	
5350	1.08	1.05	6.35	Upstream Toe (Incised)
5351	1.24	1.21	7.56	
5352	1.32	1.28	8.84	
5353	1.42	1.37	10.21	
5354	1.53	1.47	11.68	
5355	1.65	1.59	13.27	
5356	1.78	1.71	14.98	
5357	1.93	1.85	16.83	
5358	2.08	2.00	18.83	
5359	2.26	2.17	21	Capacity at 1' Freeboard
5360	2.45	2.35	23.35	Top of Embankment

Certification Statement
I, Ramsey Yazzie, hereby certify that this drawing was reviewed by me and that the information shown is complete and accurate to the best of my knowledge.

RAMSEY R. YAZZIE
NEW MEXICO
23571
PROFESSIONAL ENGINEER

LEGEND

- RAILROAD
- 5300 INDEX CONTOUR
- INTERMEDIATE CONTOUR
- 218 5422.45 L-30 LEASE CORNER
- LEASE/PERMIT BOUNDARY
- WATERSHED AREA
- TYPICAL DIVERSION BERM

N

0' 500' 1000' 1500'

Scale: 1" = 500'

NOTES:

1. FOR HYDROLOGY AND DESIGN INFORMATION REFER TO APPENDIX 26.C.
2. THE WATERSHED AREA FOR CULVERTS ARE SHOWN ON EXHIBIT 26.1-1.
3. ADDITIONAL MINE STRUCTURES, INCLUDING ROADS, RAILROAD, PONDS, IMPOUNDMENTS AND CULVERTS, ALTHOUGH PRESENT ON THIS EXHIBIT AS PART OF AERIAL BASE MAPPING, ARE NOT INTENDED TO BE CURRENT OR ACCURATE ON THIS EXHIBIT.
4. PLEASE REFER TO THE APPROPRIATE P.A.P. TEXT SECTION FOR A MINE STRUCTURE EXHIBIT REFERENCE.

DATE	DRAFT BY	REVISION DESCRIPTION	ENG.	E.G.	P.E.
8/30/25	RY	SUBMITTED TO OSM FOR APPROVAL	RY	TH	RY

APPROVALS

EXHIBIT 26.3-3

Navajo Transitional Energy Company

Navajo Mine

POND 503
PLAN, PROFILE, AND SECTION

Prepared By:	Drawn By: CS	Scale:
Approved By: SS	Plot Date: 07/30/2021	

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Drawing: No Name Ponds_080825.dwg

Appendix 26.A

Pinabete Diversion and East Diversion Design

NAVAJO MINE EXTENSION PROJECT

PINABETE DIVERSION & EAST DIVERSION DESIGN

Now known as the No Name Permit

Submitted to:
BHP NAVAJO COAL COMPANY

Date:
April 21, 2009

Norwest Applied Hydrology

Tel: (303) 782-0164
Fax: (303) 782-2560
Email aohayre@norwestcorp.com

www.norwestcorp.com

AUTHORS: ART O'HAYRE AND MICHAEL KENDRICK
SUPERVISING PROFESSIONAL ENGINEER: PAUL KOS

NORWEST
CORPORATION

APPENDIX 26.A

PINABETE DIVERSION AND EAST DIVERSION DESIGN

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APPENDIX 26.A

PINABETE DIVERSION AND EAST DIVERSION DESIGN

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APPENDIX 26.A

PINABETE DIVERSION AND EAST DIVERSION DESIGN

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SECTION 26.A

PINABETE DIVERSION AND EAST DIVERSION DESIGN

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SECTION 26.A

PINABETE DIVERSION AND EAST DIVERSION DESIGN

LIST OF EXHIBITS

EXHIBIT NUMBER	EXHIBIT TITLE
Exhibit 26.A-1	Pinabete Diversion Channel Watersheds with SEDCAD4 Subwatersheds
Exhibit 26.A-2	Pinabete Diversion Channel Plan & Profile
Exhibit 26.A-3	Pinabete Diversion Channel Flow Control Structure Typical Cross Section & Details
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Exhibit 26.A-11	Pinabete Diversion Channel Stormwater management Plan East Erosion & Sediment Controls
Exhibit 26.A-12	Pinabete Diversion Channel Stormwater Management Plan Ditch Profiles

EXECUTIVE SUMMARY

The Pinabete Arroyo is an ephemeral channel that naturally passes through the No Name permit area. Diverting the channel is necessary for continued mining operations within Area 4 South of the permit area. The arroyo carries approximately 1,100 cubic feet per second during the 10-year, 6-hour storm. A proposed diversion will direct flows to No Name Arroyo, another ephemeral channel, west southwest of Pinabete Arroyo. The Pinabete Diversion (Diversion) is approximately a 15,100 linear foot channel and has approximately 50% of attenuation for the design storm (10-year, 6-hour). The attenuation feature includes a horseshoe shaped backwater area near the tie-in point of Pinabete Arroyo and a non-impounding gabion structure that has capacity to safely pass up to the 1000-year, 6-hour event. The Diversion will function for approximately 55 years until mining operations are completed for Area 4 South.

26.A.1 INTRODUCTION

The No Name Permit (NNP) is a coal mining operation located south of the existing Navajo Mine within Area 4 South and Area 5 of the Navajo Transitional Energy Company (NTEC) lease area. The NNP extends across 11,526 acres and is crossed by two arroyos: Pinabete Arroyo and No Name Arroyo. Both Pinabete and No Name Arroyo flow from southeast to northwest to the Chaco River, which is located west of the NTEC lease and flows from south to north toward the San Juan River. The total drainage basin areas for Pinabete Arroyo and No Name Arroyo are 60.3 and 11.5 square mile, respectively. Most of the drainage areas for both arroyos are located within or upgradient of the NNP permit area as shown in Figure 26.A-1. The drainage area of Pinabete Arroyo, where it exits the NNP permit area on the west, is 55.5 square miles while the drainage area of No Name, where it exits the NNP permit area on the west, is 8.8 square miles. No Name Arroyo will not be mined-through under the current mine plan. However, the mine plan involves mining through the segment of Pinabete Arroyo that crosses the Area 4 South. This requires that the ephemeral stream flow in Pinabete Arroyo from the 43.9 square mile drainage area located east of the NNP be diverted around proposed mining operations. Although the Pinabete Arroyo channel within the mine area will be re-established in accordance with the Reclamation Plan in Part 5 of the Permit Application Package (PAP), the Pinabete Diversion will be required until completion of mining and reclamation within Area 4 South. Given the mining and topographic constraints, the only viable option for diverting Pinabete Arroyo is through the proposed diversion channel located along the south side of Area 4 South into the No Name Arroyo as shown in Figure 26.A-1.

Associated with the Pinabete Diversion is a diversion ditch (East Diversion) to be located on the east side of Area 4 South of the NNP permit area. The East Diversion will divert surface water from drainages up-gradient and east of Area 4 South that would otherwise flow into the proposed mining area as shown in Exhibit 26.A-1. The Pinabete Diversion and the East Diversion have been designed to safely accommodate the expected flows from a 100-year 6-hour storm event consistent with the OSM design requirements for permanent diversions. Appendix 26.A provides the detailed designs for the Pinabete Diversion and the East Diversion, including the methods and plans for stockpiling suitable topdressing and diversion excavation materials that will be needed for reclamation of the diversion. In addition to the items above Appendix 26.A also includes the following: Drainage, Erosion and Sediment Control Plans; Assessment of the Probable Hydrologic Consequences (PHC) along with plans to mitigate adverse impacts; PE certified drawings of the proposed diversion along with impact mitigation designs.

26.A.2 GENERAL LOCATION & DESCRIPTION

26.A.2.1 Site Location

The NNP site is located within the Navajo Nation Reservation, approximately 32 miles west-southwest of Farmington, New Mexico. Specifically it is located in Township 26 North, Range 16 West, of the 6th Principal Meridian. The NNP operation will be located south of the existing Navajo Mine within Area 4 South and Area 5 of the NTEC lease area (see Figure 26.A-1).

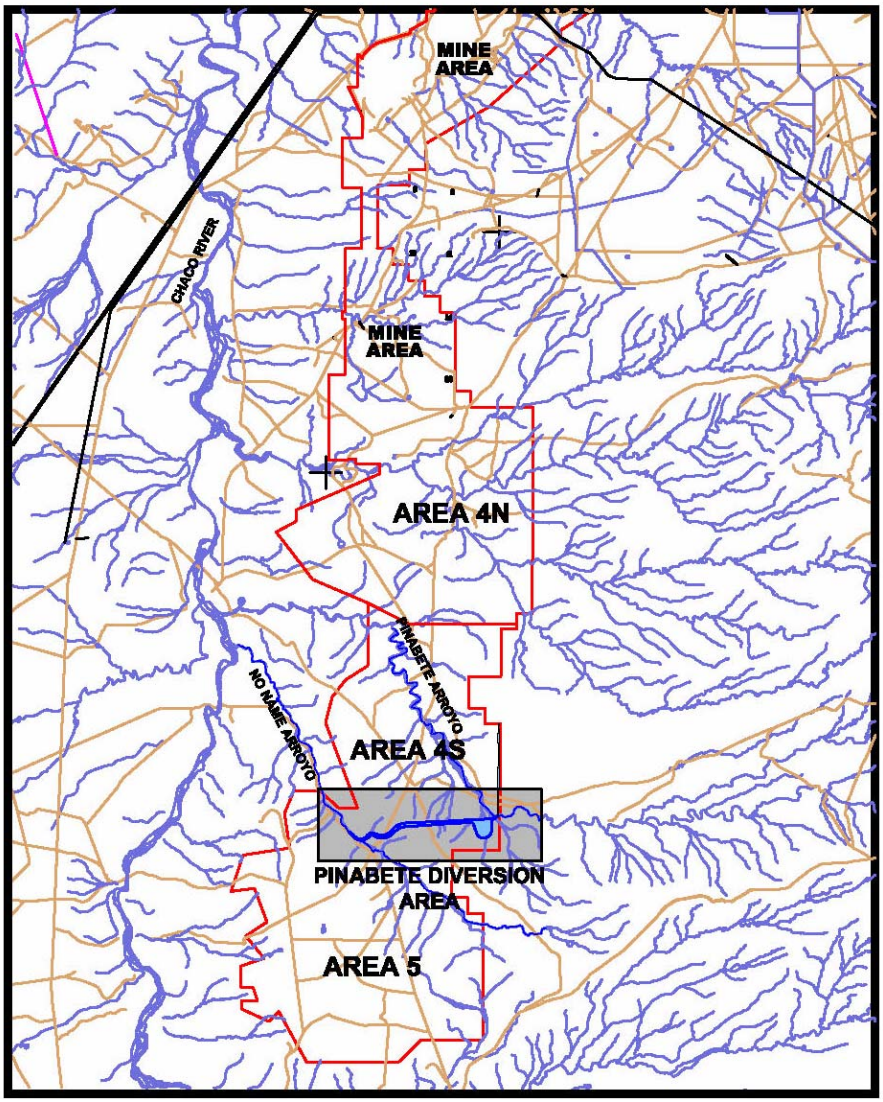


Figure 26.A-1. Vicinity Map

26.A.2.2 Description

26.A.2.2.1 General Considerations

Pinabete Arroyo will need to be diverted around proposed mining operations prior to the commencement of mining operations within Area 4 South of the NNP. The only viable option for diverting Pinabete Arroyo

is through the diversion channel, herein referred to as the Pinabete Diversion, constructed along the south side of Area 4 South that will divert water into No Name Arroyo. Pinabete Arroyo has a total drainage area of 60.3 square miles with 43.9 square miles located east and up-gradient of the NNP permit area. In addition, a diversion channel called the East Diversion collects storm runoff from an area of 2.74 square miles located east of Area 4 South of the NNP. No Name Arroyo has a total drainage area of 11.5 square miles with a drainage area of about 7.50 square miles above the confluence of the Pinabete Diversion and No Name Arroyo.

26.A.2.2.2 Diversion Details

The Pinabete Diversion will tie into the Pinabete Arroyo approximately 200 feet west of the eastern NTEC lease boundary in Area 4 South and tie into the No Name Arroyo approximately 2500 feet downstream of the No Name Impoundment. The Pinabete Diversion is approximately 15,100 linear feet long and takes several meanders to avoid deep cuts and to work in conjunction with existing drainage. The Pinabete Diversion generally flows from east to west at a grade of approximately 0.2%. The Pinabete Diversion will have a channel base width of 45 feet constructed with a 5% slope toward the center forming a wide 'V' bottom with a depth of about 1 foot. The side slopes beyond the 45-foot base will be constructed at 2:1 grades to existing ground, except for the locations where road ramps are constructed. The road ramps provide a break in the channel side slopes. Road ramps for two-way traffic have a running width of 60 feet plus an inside road ditch of variable width but typically about 10-feet. Road ramps for one-way traffic have a running width of 30 feet plus the width of an inside road ditch. The current design shows no benching for side slope stability based on a similar depth and side slope configuration at the Lowe/Dixon Diversion Channel Extension under section 11.5.5.2 of the Navajo Mine PAP. Nevertheless, site specific geotechnical information shall be obtained from locations where diversion depths are greater than 30 feet to confirm stability of the 2:1 diversion side slopes prior to construction.

The East Diversion, located on the east side of Area 4 South of the NNP permit area, functions to divert surface water from an area of approximately 2.74 square miles that would otherwise flow into the NNP mining area. The East Diversion will have a 14-foot bottom width and will be offset 150 feet west from the eastern permit boundary line to provide sufficient space to construct the relocated Burnham road inside the permit boundary.

The East Diversion and Pinabete Diversion will transfer ephemeral stream flows and storm runoff from a total drainage area of approximately 46.6 square miles around Area 4 South mining area into No Name Arroyo. Although No Name Arroyo will not be directly disturbed by mining, a segment of the No Name channel will be disturbed for the construction of Pinabete Diversion. A map of the drainage areas, tie-in points, and mine operations are included in Exhibit 26.A-1.

The Pinabete Diversion will be reclaimed when mining and reclamation operations in Area 4 South are complete. Reclamation will include the reconstruction of the Pinabete Arroyo in the mine backfill near the location of the mined out channel in accordance with the Reclamation Plan in Part 5 of the PAP.

26.A.3 DESIGN REQUIREMENTS & CRITERIA

26.A.3.1 OSM Design Requirements

The Pinabete Diversion and the East Diversion have been designed for the estimated flows from a 100-year, 6-hour storm event consistent with the OSM design requirements for permanent diversions, due to the expected 55-year life. In order to meet OSM performance requirements as specified in 30 CFR 816.43, the diversion must be designed to "minimize adverse impacts to the hydrologic balance within the permit and adjacent areas, to prevent material damage outside the permit area and to assure the safety of the public".

26.A.3.2 Design Flow Requirements & Watershed Subdivision

The 100-year 6-hour precipitation event of 2.04 inches was used to estimate the design flows for diversion channels and associated structures. Furthermore, the 10-year 6-hour precipitation event of 1.28 inches was used to evaluate the capability of the alternative flood attenuation options and to assess the erosional stability of the diversion and associated structures. These design precipitation depths were obtained from the local point precipitation frequency estimates in NOAA Atlas 14 (NOAA 2008) (See Attachment 26.A-A).

Detailed SEDCAD^{TM}4 (SEDCAD) Models of both the No Name Arroyo and Pinabete Arroyo drainages were completed by BNCC. The SEDCAD model incorporated detailed sub-watershed delineation and flow routing. Curve number estimates and relevant Revised Universal Soil Loss Equation (RUSLE) erosion parameters were assigned to each sub-watershed from site specific information on soils and vegetation cover conditions (see Section 18 Water Resources of the PAP).

26.A.3.3 Additional Criteria & Objectives

The design of the Pinabete Diversion included the following additional objectives, which were based on consultation with BHP and subsequent meetings between BHP and Norwest Applied Hydrology (NAH):

- Convey water from the Pinabete Arroyo watershed upstream of the NNP Site to the No Name Arroyo while reducing the peak flows and maintaining sediment concentrations in order to minimize impacts on the geomorphology of No Name Arroyo channel downstream of the Pinabete Diversion.
- Mitigate unavoidable potential downstream effects of increased flows from the Pinabete Diversion in order to prevent any material impacts to the water quality of the Chaco River.
- Minimize potential impacts to mining operations and include safety measures that comply with applicable Mine Safety and Health Administration (MSHA) during and following construction.
- Avoid use of MSHA classified structures, unless no feasible alternative can be developed.

- Minimize the use of concrete, rip-rap, and other fabricated materials to the extent possible.
- Design drainage control structures and utilize best management practices (BMPs) for the diversion and for the excavated material stockpiles to comply with applicable NPDES requirements and to prevent to the extent practicable the additional contribution of sediment to streamflow and runoff outside the permit area.
- Minimize the depth of excavation to avoid benching, and reduce the cost of excavation.
- Provide access to the Pinabete Diversion for maintenance purposes.

26.A.4 RESEARCH & DEVELOPMENT

26.A.4.1 Background

An evaluation of options for the diversion design was conducted to assess alternative dimensions, alternative alignments and structural measures that could be applied to meet the design objectives and requirements. NAH utilized AutoCAD Civil 3D© (AutoCAD) to refine the diversions' horizontal and vertical alignments. SEDCAD and the U.S. Army Corps of Engineers HEC-RAS (HEC-RAS) programs were utilized for the hydrologic assessment and hydraulic designs. Bentley Systems FlowMaster© (FlowMaster) was used to evaluate cross sections and hydraulic features of structures.

26.A.4.2 Research

The baseline surface water studies in Section 18 of the PAP show that both the No Name and Pinabete Arroyos carry high concentrations of sediment with storm runoff. Releasing clear water to the No Name Arroyo channel would accelerate channel erosion downstream of the release point. Thus, the preferred design for the diversion should attenuate flood flows without significant reductions in sediment concentrations. The Pinabete Diversion has been designed not only convey the design flows, but it will serve as an engineered solution to mitigate the impacts on No Name Arroyo from the diversion of the additional flows from Pinabete Arroyo watershed during the operational life of the diversion.

Section 18 of the PAP includes an assessment of the channel characteristics within No Name Arroyo. As discussed in Section 18, the No Name Arroyo channel downstream or west of the Burnham Road crossing is an unstable channel with segments of channel incision, bank sloughing and head cutting. The detailed 1-foot topographic survey and channel profile provided in Section 18 shows a major head cut along the No Name channel below the confluence with the Pinabete Diversion and just upstream of the western permit boundary. This head cut involves a near vertical drop of about 10 to 12 feet, and is approximately 30 feet wide. Downstream of the head cut the channel is incised about 8 to 12 feet, and the channel width varies from approximately 10 to 30 feet with near vertical channel banks. Upstream of the head cut, No Name Arroyo consists of a wide, shallow channel that is heavily braided in places and is vegetated with grasses and weeds, brush, and some salt cedar.

Gullies, head cuts, and channel instabilities are a common natural feature in the arid and semi-arid landscapes of the Southwestern United States. The cycle of channel incision and filling is called arroyo evolution (Schumm and others, 1984; Gellis and others, 1991). Following channel incision, an arroyo evolves through time from a narrow, V-shaped gully with low width-to-depth ratios to a wide U-shaped channel. Sediment deposition and channel aggradation increase as the channel widens. With channel aggradation, a flood plain and small channel system develops within the wide U-shaped channel. Channel aggradation within the ephemeral stream valley results in steepening of the valley slope that continues until

channel incision occurs with a repeat of the cycle of arroyo evolution. This spatial variation in channel incision and channel deposition with arroyo evolution is particularly evident in the reach of No Name Arroyo between the No Name Impoundment and its confluence with the Chaco River (see Exhibit 26.A.1).

26.A.4.3 Development

The final horizontal and vertical alignment for the Diversion was developed after several variations of the conceptual design was modeled. The conceptual diversion design and alignment was developed by BNCC. This conceptual diversion design and alignment was used as the Base case for comparison in developing other alternatives. The conceptual diversion was a trapezoidal channel with a 45-foot bottom width and 2:1 side slopes. The alignment for the conceptual design of Pinabete Diversion is shown in Figure 26.A-2. The length of the concept diversion was 14,263 feet and the design slope was 0.336%. The estimated excavation volume was 4,200,000 cubic yards (yd^3) and the design velocities for the 10-year 6-hour and 100-year 6-hour storm events were estimated at 5.5 and 7.4 feet per second (fps), respectively.

The primary criteria used for comparison of the diversion options were:

- the percentage of peak flow attenuation by the diversion structure for the 10-year, 6-hour event;
- the percentage of peak flow attenuation by the diversion structure for the 100-year, 6-hour event;
- the estimated excavation volume;
- the maximum design velocity for the 10-year, 6-hour event; and
- the maximum design velocity for the 100-year, 6-hour event.

26.A.4.3.1 Alignment Development

Two alternative horizontal alignments were evaluated in addition to the Base alignment developed by NTEC. These alternate alignments are shown in Figure 26.A-2 along with the Base alignment from NTEC. The first alternative alignment that was developed increased the channel length through areas of lower excavation depth in order to reduce design velocities and increase routing length. The length of the first alternative alignment increased to 17,245 feet while the diversion channel slope was reduced to 0.278% and the estimated excavation volume for this alternate alignment increased by approximately 800,000 yd^3 making the total excavation 5,030,000 yd^3. The design velocities for the 10-year, 6-hour and 100-year, 6-hour storm events were reduced to 5.1 fps and 6.9 fps, respectively. However, the increase in diversion length resulted in less than a 2% reduction in the peak flow for the 10-year 6-hour and 100-year 6-hour storm events.

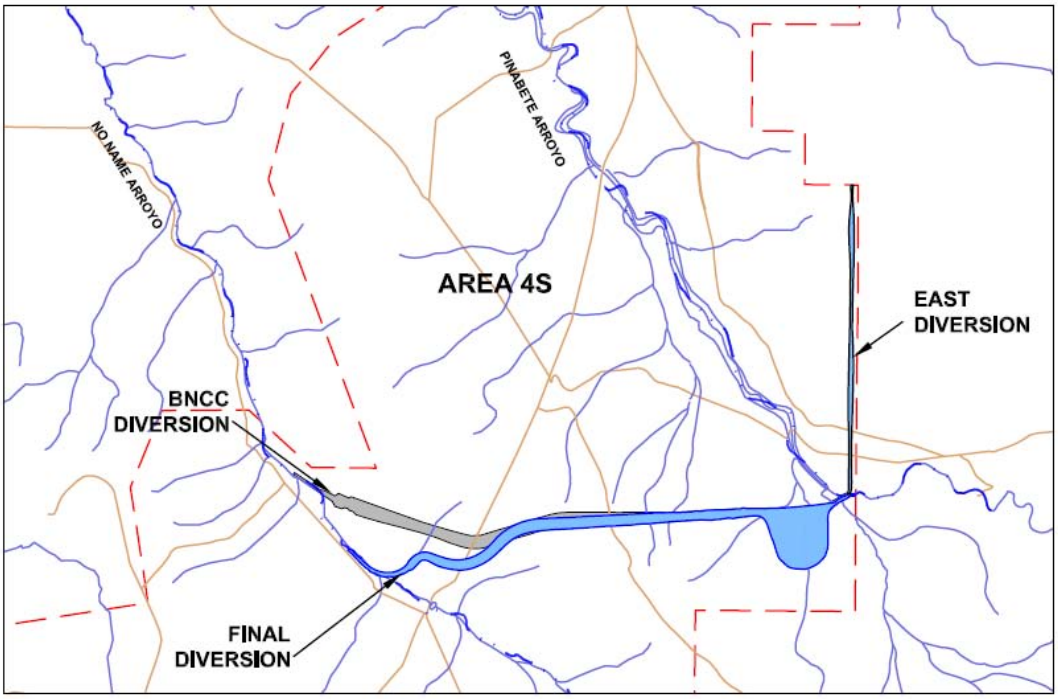


Figure 26.A-2. Alternative Diversion Alignments

The final alignment that was developed and assessed reduced both the channel length and channel slope by moving the confluence point with No Name Arroyo upstream about 2,000 feet to a location approximately 2,000 feet downstream of the overflow for No Name Impoundment at the Burnham Road crossing. This option reduced the diversion length to 15,470 feet and reduced the channel slope to about 0.2%. As a result, the excavation volume was also reduced relative to the base case and the design velocities for the 10-year 6-hour and 100-year 6-hour storm events were reduced to 4.9 fps and 6.6 fps, respectively. Due to the favorable reduction in design velocities and excavation volume, this horizontal alignment was selected for detailed design. However, the final alignment alone would not attenuate the peak flows through the diversion. Concurrent with the diversion alignment evaluation, various combinations of alternative channel widths and alternative flood flow attenuation structures were evaluated as described in the subsequent sections of the report.

26.A.4.3.2 Structure Development

Several types of flood attenuation structures were examined with respect to the diversion design objectives and requirements. Some structures were rejected based on the fact that sediment deposition would require frequent maintenance and that the structure would be classified as an impounding structure according to MSHA criteria. These structures included an earthen embankment with a culvert, an earthen embankment with an armored spillway, and a large rock check dam. Furthermore, the reduced sediment concentrations in the outflow from these structures would be more erosive that the natural sediment laden water and would accelerate channel erosion downstream of the release point. Consequently, non-impounding control structures were selected for further evaluation. In order to help attenuate flood flows, these structures restrict flows within the channel and thereby increase flow depths and temporary flood storage in the channel upstream of the control structure. The effectiveness of the control structure for attenuation of flood flows can be increased by increasing the diversion channel widths upstream of the control structure.

Several types of control structures were considered, including concrete control structures, rock or rip rap structures, and rock gabion structures. Concrete control structures were rejected because of the higher risk for failure given the prevalence of sodic soils and potential for soil piping. The concrete structure would also need to be removed during reclamation, which would add to the overall cost of the structure. Rock or riprap structures were rejected based on being less effective at attenuating flood flows due to lower side slopes required to ensure stability. These structures were also rejected based on the lack of ability to obtain necessary materials required for the structure. The rock gabion structure was selected based on the ability to produce steep side slopes that would serve to restrict flows and thereby increase depths upstream of the structure. The rock gabions are somewhat flexible and capable of self healing in the event of soil piping or gabion movement during extreme events. The gabion structure does not impound water and thus is not an MSHA impounding structure. Some sediment deposition may occur upstream of the structure, depending upon channel widths and flow velocities. However, most of the fine grained sediment should remain in suspension and some of the sediment that is deposited will be removed during the falling stage of the flood or by subsequent flow events. Only the very coarse sediments are likely to accumulate above the structures, and removal or maintenance is likely to be infrequent. Finally, the gabion structure can be more easily repaired if damaged by floods and removed during final reclamation.

Several design configurations for the gabion structure were evaluated based on the design storms and attenuation ability. A gabion structure configuration that produced the greatest attenuation for the 10-year, 6-hour event was selected for further evaluation in conjunction with the selected channel alignment and alternative channel widths.

26.A.4.3.3 Attenuation Evaluation

Peak flow attenuation was modeled iteratively to achieve the best design. As previously stated, two modeling programs were utilized to analyze and evaluate diversion alternatives. The SEDCAD model of the Pinabete Arroyo drainage, which was developed by NTEC, was modified to evaluate the diversion options. The HEC-RAS model was used to both develop the stage-discharge relationship for the various proposed gabion attenuation structure cross sections and to confirm that the SEDCAD reservoir routing procedure adequately characterized the routing performance of the gabion structure.

The gabion structure with the 45-foot channel base width provided very little attenuation in the peak flows within the diversion. However, the gabion structure combined with increased channel widths greatly increased the attenuation of the peak flows from the diversion for the design storms. Various combinations of both the gabion structures and channel widths, ranging from 45 feet to 290 feet, were evaluated for peak flow attenuation of the design storms using the SEDCAD routing model. The peak flow attenuation results for both the 10-year and 100-year, 6-hour design events for various options are summarized in Table 26.A-2. All the options included in Table 26.A-2, except for the base case and the final selected alternative, include the alignment with the extended channel length. These evaluations show that the gabion structures combined with the wider channel sections are most effective in attenuating peak flows. Furthermore the evaluation indicated that the upstream structure is the most effective at attenuating peak flows and that the successive effectiveness of the downstream structures significantly decreased for each additional structure. For most of the structures the excavation depth is relatively high except for the structure located furthest upstream. Therefore, the cost-effectiveness of each additional downstream structure declines even more precipitously with each additional structure.

Based on these modeling results it was determined that increasing channel widths in this segment upstream of the first gabion structure was found to be most effective for attenuating peak flows. Therefore the Final alignment includes a horseshoe shaped bend in the upstream portion of the diversion as shown in Exhibit 26.A-2. Increasing the width to encompass the entire horseshoe bend was found to be the most effective option. Also with this alternative only one gabion structure was needed. The horseshoe bend was included in the evaluation of options in Table 26.A-2. Additional gabion structures located downstream of the first structure provide little additional attenuation in peak flows for the design storm events. This alternative with only one gabion flood attenuation structure also allowed for the diversion length to be reduced. The final selected diversion alignment and attenuation structure provides significant attenuation of peak flows for the 10-year 6-hour event (50%) and acceptable results for the 100-year, 6-hour event (16% attenuation) in comparison with some of the other options shown in Table 26.A-2. Additional peak flow attenuation of Pinabete Arroyo is expected to occur as a result of the re-aligned Burnham Road crossing. Although the culverts or pipe arches installed for this road are unlikely to cause much backwater or temporary flood

storage for the 10-year, 6-hour design event, the backwater and temporary flood storage would be significant for the more extreme events, such as the 100-year, 6-hour design storm, which would help to further attenuate peak flows from the Pinabete Diversion during these extreme events.

Other criteria for the final design alternative were also favorable, including the significantly lower excavation volume and the lower channel design velocities of 4.9 fps and 6.6 fps for the 10-year, 6-hour and 100-year, 6-hour events, respectively. The estimated excavation volume of 3,500,000 yd^3 for the final design alternative includes the volume associated with excavation of the horseshoe bend area.

Table 26.A-1 Pinabete Diversion-Scenario Design Details

Scenario	Elevation		Length (ft)	Slope	Approximate Volume (yd3)	Design Velocities (fps)	
	Start	End				10yr, 6hr	100yr, 6hr
Base	5437.95	5389.99	14,263	0.336%	4,200,000	5.63	7.64
Re-aligned	5437.95	5389.99	17,245	0.278%	5,030,000	5.07	6.85
Final	5437.95	5401.15	15,478	0.238%	3,500,000	<4.90	<6.60

Table 26.A-2 Pinabete Diversion-Attenuation, 10-Year and 100-Year Events

Scenarios	Description	In (cfs)	Structure Locations					Out (cfs)	% Atten
		10-year 100-year	22+00 Out	42+00 Out	85+00 Out	130+00 Out	161+00 Out	10-year 100-year	10-year 100-year
Base	45' Channel	1,117 2,859						1,098 2,810	1.70% 1.70%
Re-aligned	45' Channel	1,117 2,859						1,091 2,792	2.30% 2.30%
Option 1	45' Ch & 5 Gabions	1,117 2,859	948 2,397	956 2,420	980 2,467	1,014 2,504	1,042 2,523	739 2,397	33.80% 16.20%
Option 2	290' Ch & 5 Gabions	1,117 2,859	413 1,837	479 1,922	580 2,236	776 2,393	913 2,436	413 1,837	63.00% 35.80%
Option 3	145' Ch @ 3 Gabions & 45' Ch @ 2 Gabions	1,117 2,859	840 2,441	848 2,446	916 2,490	940 2,504	995 2,523	840 2,441	24.70% 14.60%
Option 4	290' Ch @ 3 Gabions & 45' Ch @ 2 Gabions	1,117 2,859	551 2,139	557 2,150	741 2,378	776 2,393	913 2,436	551 2,139	50.60% 25.20%
Option 5	290' Ch @ 2 Gabions, 145' Ch @ 42+00 & 45' Ch @ 2 Gabions	1,117 2,859	640 2,301	647 2,309	741 2,378	776 2,393	913 2,436	640 2,301	42.70% 19.50%
Option 6	290' Ch @ 2 Gabions, 145' Ch @ 42+00	1,117 2,859		678 2,349		776 2,393	913 2,436	678 2,349	39.20% 17.80%
Final	45' Ch w/horseshoe & 1 Gabion @ 121+00	1,117 2,859						564 2,412	49.50% 15.60%

26.A.5 DESIGN MODELING METHODS

The HEC-RAS and SEDCAD design/modeling programs were utilized to analyze and evaluate diversion alternatives, as discussed previously. These design/modeling software programs were also utilized to develop the design for the gabion flood attenuation structure, drop structures, transition segment, drainage and storm water controls for stockpiles, and the road ditches. The design software program FlowMaster was also used to evaluate hydraulic designs for channel cross sections and hydraulic features of structures.

26.A.5.1 HEC-RAS

HEC-RAS was used to develop the stage discharge relationship for the proposed gabion attenuation structure and to confirm that the SEDCAD reservoir routing procedure adequately characterized the routing performance of the gabion structure. The HEC-RAS modeling results for the stage discharge relationship for the gabion structures are provided in Attachment 26.A-B. The summary results are provided for cross section RS1.000, the center cross section of the structure that is being modeled. HEC-RAS was also used to develop the design for the transition segment at the confluence of the Pinabete Diversion with the No Name Arroyo. HEC-RAS modeling results for the transition are also provided in Attachment 26.A-B. The HEC-RAS report format has been edited to show only the information needed to demonstrate water surface elevations through the transition section.

26.A.5.2 FlowMaster

FlowMaster was utilized to evaluate specific cross sections for the project and reduce the number of channel sizes to input to HEC-RAS and SEDCAD. The FlowMaster results are located in Attachment 26.A-C. There are several cross section design sheets including Exhibits 26.A-3, 26.A-5, 26.A-6, 26.A-7, 26.A-8.

26.A.5.3 SEDCAD

Detailed SEDCAD models of both the No Name and Pinabete Arroyos were completed by BNCC. The SEDCAD model of the Pinabete Arroyo drainage was modified to evaluate the diversion options and to develop designs for the selected option. The SEDCAD models used to analyze the Final alignment are provided in Attachment 26.A-D. The SEDCAD models used to analyze and evaluate alternatives for the Pinabete Diversion are not provided in Attachment 26.A-D but available upon request. The SEDCAD modeling results for different flood attenuation options are discussed in Section 5 of Appendix 26.A.

The SEDCAD design/modeling software program was also used to develop the designs for the selected diversion option. These results are discussed in Section 7 of Appendix 26.A and available upon request. The SEDCAD design/modeling software program was also used to develop the designs for the Drainage, Erosion and Sediment Control Plan presented in Section 9 of Appendix 26.A are provided in Attachment 26.A-E.

26.A.6 DESIGN DETAILS

26.A.6.1 Pinabete Diversion Design

The final Pinabete Diversion alignment plan and profile are provided in Exhibit 26.A-2. This design includes the excavation of the horseshoe bend at the upgradient end of the main diversion. This excavation provides for a wide channel segment upgradient of the gabion control structure and both function together to provide significant attenuation in flood flows passing through the diversion structure as demonstrated in Table 26.A-2.

The proposed gabion attenuation structure was selected based on consideration of a variety of flood flow attenuation structures. Unlike most of the flood attenuation options, the proposed gabion attenuation structure is not an impounding structure that would be subject to MSHA impoundment regulation. Some sediment deposition may occur within the horseshoe excavation area upstream of the structure. Nevertheless most of sediment will remain in suspension or be removed during subsequent flood events. It is anticipated that the need for sediment removal from the horseshoe excavation will be very infrequent, perhaps only two or three times during the anticipated 55-year life of the diversion. The design for the gabion structure is provided in Exhibit 26.A-3.

The gabion structure restricts flows such that a greater flow depth is needed at the structure to convey the design flow rate than would be required in the unimpeded diversion channel. The stage-discharge relationship for the gabion structure was developed using the HEC-RAS model (see Attachment 26.A-B). Although the gabion attenuation structure does not impound water, the influence of the gabion structure coupled with the upstream horseshoe excavation on flood flows can be modeled using the reservoir routing procedure in SEDCAD. The SEDCAD modeling results for the Pinabete Diversion are included in Attachment 26.A-D. These include the stage-discharge relationship for the gabion structure and the storage-elevation relationship within the horseshoe excavation, along with the SEDCAD modeling results for other flood attenuation options. The maximum extent of backwater upstream of the gabion structure for both the 10-year, and 100-year, 6-hour storm events are shown in Exhibit 26.A-4. Backwater influences that extend beyond the permit boundary will occur only during extreme events, such as the 10-year, 6-hour storm or larger, and are confined to the channel. Thus, the Pinabete Diversion and associated flood attenuation structure will have very little influence on the flood levels along Pinabete Arroyo beyond the permit boundary.

The Pinabete Diversion downstream of gabion structure will have a channel base width of 45 feet constructed with a 5% slope toward the center forming a wide ‘V’ bottom with a depth of about 1 foot as shown in the Diversion Channel detail in Exhibit 26.A-5. The wide ‘V’ configuration will behave like a pilot channel keeping low flows within the center of the channel to prevent the formation of a meandering

channel within the wide channel base. The side slopes beyond the 45-foot base will be constructed at 2:1 grades to existing ground, except for the road ramp locations, where there is a break in slope for the road and ditch. Road ramps are provided at the locations shown in Exhibit 26.A-2 for construction access and for long-term inspection and maintenance of the diversion. The running width of all roads and road ramps where two-way traffic is anticipated will be at least 60 feet. One-way roads will be at least 30 feet wide. MSHA safety berms will be placed on the outside edge of road ramps and a road drainage ditch will be constructed on the inside edge of road ramps as shown in the Road Ramp detail provided in Exhibit 26.A-5. The maximum grade for any segment of the road ramp is 8%. In general, the roads have been designed with 7% grades as a buffer.

A diversion berm is needed in the attenuation area of the Diversion to help keep flood flows from overflowing into Area 4 South where it would disrupt active mine operations. The design elevation for the main Pinabete Diversion berm is 5455.5 ft. elev. as shown in the typical diversion berm design section included in Exhibit 26.A-5. Rock gabion protection shall be placed on the channel side of the diversion dike placed across Pinabete Arroyo as shown in the Diversion berm section. The Pinabete Arroyo Diversion Transition details are provided in Exhibit 26.A-5. The rock gabion berm protection is provided to prevent scour along the berm at this location, where flows in Pinabete Arroyo are redirected into the diversion channel. Prior to construction of the berm, suitable topdressing material will be removed from all construction locations. Prior to placement and compaction of the suitable material during construction of the berm, a stable foundation will be prepared by excavating unsuitable material or, if suitable, the top 6-inches will be scarified and recompacted. The alluvial sands along Pinabete Arroyo are likely to be unsuitable as foundation material but suitable as topdressing material and will be removed prior to berm construction as indicated on Diversion Berm Detail in Exhibit 26.A-5. The diversion berms will be constructed in lifts using suitable mixtures of clay, silt, sand and gravel from the Pinabete Diversion excavations that are placed and compacted in accordance with the construction specifications.

Coal seams exposed in the channel side walls of the Pinabete Diversion will be over excavated and covered with at least 5 feet of suitable material as shown in the Coal Removal detail provided in Exhibit 26.A-5. Similarly, coal seams exposed in the base of the channel will be over excavated and covered with at least 2 feet of suitable material as shown in the Coal Removal detail provided in Exhibit 26.A-5. Cover materials will be placed and compacted in accordance with the construction specifications.

The Pinabete Diversion begins to tie into the No Name Arroyo at station 24+14. At this point the invert elevation of the diversion is eight to nine feet lower than the No Name Arroyo (see Exhibit 26.A-2). In order to protect No Name Arroyo and the Pinabete Diversion from erosion, a drop structure has been designed to compensate for the elevation difference. Another gabion drop structure has been designed for the No Name tributary that will be intercepted by the Pinabete Diversion at Station 20+90 as shown on

Exhibit 26.A-2. Both of these drop structures have been designed for the peak flow from a 100-year, 6-hour event. Design details for these drop structures are provided in Exhibit 26.A-6.

As shown in Exhibit 26.A-2, the stationing for the Pinabete Diversion begins at the confluence with the No Name channel at the downstream station designated 10+00. The invert elevation of the diversion channel and No Name Arroyo at this station are essentially the same. A transition segment has been designed to provide as safe transition of flow from the Pinabete Diversion channel with a base width of 45 feet and 2:1 side slopes to the natural No Name channel. The No Name channel has a bottom width ranging from 8 to 15 feet and side slopes ranging from greater than 1:1 to about 4:1. This transition design is provided in Exhibit 26.A-7.

The transition requires that the channel bottom width be reduced from 45 feet at the start of the transition to 10 feet at the connection with the natural channel at the end of the transition. Channel side slopes also change through the transition segment to conform to the natural channel side slopes at the end of the transition. The channel sides will be constructed following design grades through the transition to existing ground. Channel bank protection is provided through the transition segment with a gabion revetment that extends to the existing overbank surface or to the flood level estimated for the peak flow from the 100-year, 6-hour precipitation event as shown in Exhibit 26.A-7, whichever is lower. The gabion revetment protects the banks from increased channel velocities resulting from reducing channel widths and from channel overflows and return flows that will occur when the confines of the diversion channel in the transition are exceeded during flood flows.

Exhibit 26.A-7 shows the estimated water surface elevation through the transition segment for the peak flow from the 100-year and 10-year, 6-hour design storm events. The water surface elevations were estimated from a steady state HEC-RAS modeling of the hydraulics of the transition segment. These HEC-RAS results are included in Attachment 26.A-B.

26.A.6.2 East Diversion Design

This section describes the designs for the East Diversion that will be constructed on the east side of Area 4 South of the NNP permit area to divert surface water from a watershed of approximately 2.74 square miles located east of Area 4 South. The design plan and profile for East Diversion is provided in Exhibit 26.A-8. The East Diversion is 7,748 feet in length and ends at Pinabete Arroyo, where it joins the Pinabete Diversion. The diversion is aligned in a straight north-south direction and off-set 150 feet west at the diversion centerline from the eastern permit boundary. This alignment was selected to permit construction of a road within the permit area to the east of the diversion and to minimize the extent of encroachment on the mine permit boundary.

The East Diversion is designed with a bottom width of 14 feet and channel grades that vary from 0.6% within the upper segment (Segment 1) to 0.25% within the lower segment (Segment 2) as shown in Exhibit 26.A-8. The estimated velocities for the 10-year, 6-hour design storm are 3.03 fps in the upper segment and 2.99 fps in the lower segment of the diversion. The design velocities are well below the limiting velocity (6 fps) for erosion protection for excavated channel materials as indicated in the design table provided in Exhibit 26.A-8 and in the SEDCAD modeling results in Attachment 26.A-D.

As described in Section 7.1, the gabion flood attenuation structure included in the Pinabete Diversion design creates a backwater effect within the horseshoe excavation that extends up the East Diversion channel as well as the channel of Pinabete Arroyo during extreme precipitation events such as the 100-year, 6-hour event and the 1000-year, 6-hour event. The backwater influence in the East Diversion channel for the peak flow during these extreme precipitation events is represented in Exhibit 26.A-8.

Low height diversion berms are needed so that flood flows for the 100-year 6-hour design storm for the East Diversion, including backwater from the proposed gabion structure, do not overflow the confines of the diversion structure and into active mine areas within Area 4 South. The diversion berms have sufficient height to contain flows from the 1000-year, 6-hour storm, similar to the diversion berms for the main Pinabete Diversion. However, the low height diversion berm (less than 3-feet) for the segment between Stations 18+00 and 24+70 along the East Diversion has a design elevation of 5454.1 feet above mean sea level (amsl), approximately 1.4 feet in elevation lower than the other diversion berms including the diversion dike across the valley of Pinabete Arroyo. The lower elevation for this structure allows for overflow of the berm at this isolated segment in the unlikely event that a flood flow exceeding the 1000-year, 6-hour storm is ever experienced during the life of the Pinabete Diversion. An overflow or even a breach in the very low height berm at this point along the East Diversion would limit the overflow that may reach the mine and would greatly reduce the likelihood that there would be no breach of the higher diversion dikes located across Pinabete Arroyo at the beginning of the Pinabete Diversion. This feature would also divert most of the flood flow during an extreme flood exceeding the 1000-year, 6-hour storm through the Pinabete Diversion while any flow to the mine area from an overflow or breach of the berm is quite limited. A typical diversion berm design section included in Exhibit 26.A-8 along with the plan and profile showing the berm locations.

26.A.7 CONSTRUCTION OPERATIONS AND SEQUENCE

The construction of the Pinabete Diversion and the East Diversion will proceed in a manner which will minimize offsite sediment releases, keep existing drainage operable as long as possible and protect construction areas. The East Diversion can be constructed at any time within the construction sequence for the Pinabete Diversion. However, construction of the East Diversion should begin at the southern downstream end at Pinabete Arroyo and proceed north, up gradient, to minimize the magnitude of storm water runoff from overland flow that could be intercepted during construction of the diversion.

Construction of the Pinabete Diversion will be sequenced so that the segment at the start of the Pinabete Diversion along Pinabete Arroyo between Stations 155+50 and 161+84 is the last segment constructed and the terminus of the diversion within No Name Arroyo between Stations 10+00 and 25+00 is the second to the last segment constructed. In the event that storm water collects at low points within the diversion as it is being constructed, construction could be delayed in this area until the water seeps or evaporates. Alternatively the water could be pumped to one or more of the storm water containment structures associated with the stockpiles.

Prior to construction, an intensive pre-salvage soil-sampling program will be conducted to identify soil material suitable as topdressing material. Badlands and Natrargids are typically unsuitable sources of topdressing substitute and will not be sampled or salvaged during diversion construction. Prior to stripping topdressing material along the main diversion and associated excavation material stockpile locations, initial storm water drainage controls will be employed in accordance with the plan in Section 9.0. Scrapers and dozers will most likely be used for stripping of topdressing materials. Stripping of topdressing materials may extend to a depth of 5 feet provided the material is suitable. All alluvial material within the construction area will be removed and placed in topdressing stockpiles along with other suitable topdressing material. All material below 5 feet of the surface, except for alluvial materials along Pinabete Arroyo, is classified as “regolith” and will be placed in separate excavation material stockpiles.

Scrapers and dozers may continue to be used for excavation of the diversion until depths and terrain become too difficult for their operation. The remaining excavation will then be excavated and trucked to the stockpiles via the road ramps. Coal seams exposed in the channel side wall or in the base of the channel will normally be ripped with dozers and placed in trucks using front-end loaders. Salvageable coal will be hauled to coal sizing or blending facilities located northwest of diversion construction. Coal materials that are not salvageable will be hauled to the excavation stockpile location and dumped. The coal material placed in the excavation material stockpile will be covered with at least three feet of non-coal material.

The construction sequence of the diversion may be broken into segments to maintain a flexible schedule and to allow for the best utilization of equipment and manpower. Construction of the diversion ramp roads will be an ongoing operation as excavation depths for the diversion increase.

Construction of the diversion terminus at No Name Arroyo will not be started until the construction of horseshoe excavation, the gabion flood attenuation structure and main segment of the diversion has been completed. This includes the removal of all coal from the base of Pinabete Diversion and the completion of the road ramp drainage ditches. Construction of the diversion terminus will include constructing the drop structures for both No Name Arroyo at Station 23+14 and the No Name Tributary at Station 20+90. The final connections to Pinabete Arroyo and East Diversion can be constructed once the drop structures, transition and No Name connections have been built. This sequence of construction is necessary so that sediment transport to No Name Arroyo from the construction of the Pinabete Diversion is minimized.

26.A.8 DRAINAGE AND SEDIMENT CONTROL PLAN

A brief description of the nature of the construction activity and approximate time frames can be found in Sections 1 through 8 of Appendix 26.A. The No Name Arroyo would receive storm water from this site. The watershed descriptions can be found in Section 2 of Appendix 26.A. The No Name Arroyo and the downstream Chaco River have ephemeral flow, and is not the subject of Total Maximum Daily Loads (TMDLs). A site map showing undisturbed site features may be reviewed in Figure 26.A-1 and Figures 26.A-9-12 show the placement of structural and non-structural BMPs.

Potential sources of pollutants in storm water runoff during construction and operation of the diversion will be managed with BMPs to control erosion and sediment. This section of the design report describes the BMPs that shall be implemented to control erosion and sediment from these non-process areas in order to maintain compliance with the Western Alkaline Coal Mining Subcategory for mine discharges. In arid regions, the natural vegetative cover is sparse and rainfall commonly occurs during localized high-intensity, short-duration storms. These conditions contribute to flash floods that transport large amounts of sediment. In accordance with the Western Alkaline Coal Mining Subcategory for mine discharges, BMPs shall be implemented to maintain the average annual sediment yield equal to or below pre-mined, undisturbed conditions. To achieve these results, site-specific sediment control plans have been developed using the SEDCAD Model. Runoff and sediment will be controlled using BMPs designed for the estimated runoff from a 10-year, 24-hour precipitation event. In most cases, the BMPs provide sufficient capacity to contain the entire runoff volume from a 10-year, 24-hour precipitation event plus sediment storage.

26.A.8.1 Drainage Controls

The Pinabete Diversion intercepts storm water runoff from overland flow and from small channels that flow northeast towards Pinabete Arroyo and northwest towards No Name Arroyo. Temporary containment berms will be constructed across the small tributaries that drain across the diversion construction area to minimize storm water runoff within the diversion construction area. During the later phases of the diversion construction, diversion berms and ditches will be used in combination to route surface runoff into the Pinabete Diversion via ditches located adjacent to the road ramps. Rock lined road ramp ditches will be utilized to route flows safely down into the Diversion. These ditches will work in conjunction with the access roads and have been designed so that the steep grades do not contribute additional sediment.

Berms or ponds will intercept runoff from the topdressing and excavation material stockpiles to prevent sediment from disturbed areas reaching No Name Arroyo or Pinabete Diversion. These BMPs have been designed to contain runoff from the 10-year, 24-hour event even when 50% full of sediment. During final construction overflow structures or spillways will be installed at locations where the maximum depth of standing water impounded by a berm resulting from the 10-year, 24-hour design storm runoff event (1.53 inches of rainfall) exceeds three feet. Spillways have been designed to safely pass the peak flow from a 25-year, 6-hour event in accordance with OSM design criteria. Berms have been designed with 2:1 side slopes

and will have at least 1-foot of freeboard for the design event. Storm runoff that flows through berm spillways will be routed through ditches, natural channels and/or drainage swales to rock-lined graded road ramp channels and into the main diversion.

The storm water drainage delineation for the Pinabete Diversion and associated topdressing and diversion excavation material stockpiles is provided in three Exhibits (26.A-9, 26.A-10 and 26.A-11) covering the west, central, and eastern segments of the Pinabete Diversion and associated drainages. SEDCAD flow models have been developed for the drainages contributing to each of the five rock-lined graded road ramp channels that flow into the Pinabete Diversion. One road ramp, as shown on Exhibit 26.A-9, does not have a designed rock-lined graded road ramp channels because there is no upgradient drainage to this road ramp. A small triangular ditch, with a 3:1 road side-slope and a 2:1 inside slope will be installed adjacent to this road ramp to collect road drainage. This ditch will be lined with road gravel.

The East Diversion intercepts storm water runoff from overland flow and drainage swales that flow toward Pinabete Arroyo. The areas to be utilized for stockpiling topdressing material and excavated reclamation material shall be placed on the west side of the diversion, where storm water runoff from these stockpiles drains to the active mine area, as shown in Exhibit 26.A-8. Temporary erosion and sediment controls consisting of berms and silt fences will be utilized to control sediment in storm water runoff from the material excavation stockpiles as shown in Exhibit 26.A-8. Suitable topdressing material removed during construction of the East Diversion will be placed in designated Topdressing Material Stockpiles as described in Section 9.4.

Construction of the East Diversion will begin at the downstream end at Pinabete Arroyo and precede upgradient to minimize the magnitude of storm water runoff from overland flow that could be intercepted during construction of the diversion. Sediment from the active construction areas along the East Diversion will be controlled by the temporary installation of hay bale berms, which will be removed and may be used as mulch following completion of construction.

26.A.8.2 Culverts, Road Ramp and Diversion Ditches

All culverts and spillways associated with the berms and pond are designed to pass the peak flows from the 25-year, 6-hour event assuming the structures are full at the beginning of the storm event. Due to the dry climate at the mine site, it is likely that the structures will be dry at the start of a storm event.

For ease of discussion the following abbreviated designations have been given to the different watersheds and structures:

WS – Undisturbed Sub-Watersheds
TDS - Topdressing Stockpiles
MS – Material Stockpiles
DD – Diversion Ditch
CB – Containment Berm
CP – Culvert

26.A.8.2.1 Ramp Ditch 1 and Watershed 1

Road Ramp Ditch 1 and associated drainages from Watershed 1 (52.46 acres not including drainage from MS 1-2, which drains to containment Pond 1-1) are shown on Exhibit 26.A-9. This ramp ditch collects drainage from TDS 5, MS 1-1 and undisturbed sub-watersheds. Diversion Ditch DD 1-2 which is connected to Road Ramp Ditch 1 receives drainage from WS1-1, including flows from Ditch D 1-3, and spillway overflows from the TDS 5 and MS 1-1 containment berms. Pond 1-1 has been designed with sufficient capacity to contain the entire volume of runoff from a 100-year, 6-hour storm without overflowing. Consequently, Pond 1-1 has been designed as a containment pond with no spillway. In the event that both the pond capacity were exceeded by an extreme event or series of extreme events, the pond could overflow the road adjacent to the pond. The pond overflows would flow across the toad and into the rip rap lined (6-inch D_{50}) Road Ramp Ditch 1 on the opposite side of the road so that erosion of the road would be limited.

The plans for Road Ramp Ditch 1, DD 1-2, DD 1-3, and storm water retention structures for stockpiles are provided in Exhibit 26.A-9. Typical design drawings and design tables for the ditches, culverts, and storm water retention structures are provided in Exhibit 26.A-12. Diversion ditches and the road ramp ditch have been designed to safely accommodate the peak flow from a 10-year, 24-hour precipitation event. SEDCAD model results for the 10-year, 24-hour event, 25-year, 6-hour event for Ramp Ditch 1 and associated Watershed 1 are provided in Attachment 26.A-E.

26.A.8.2.2 Ramp Ditch 2 and Watershed 2

Road Ramp Ditch 2 and associated drainages from Watershed 2 are provided in Exhibit 26.A-10. This ramp ditch collects drainage from WS 2-1, TDS 6, TDS 7, and MS 2-1. A diversion ditch and berm system, DD 2-1, diverts flow from part of WS 2-1 around MS 2-1 and into Road Ramp Ditch 2. The profile for this ditch is provided in Exhibit 26.A-12 along with the diversion ditch design table. Overflow from the berm associated with TDS 7 passes through CP 101 and into Road Ramp Ditch 2 as shown in Exhibit 26.A-10.

Road Ramp Ditch 2 receives flow from DD 2-1 together with overflows from the containment berm spillway associated with TDS 6 and MS2-1. The overflow from the containment berm at MS2-1 also includes overflows from the berm associated with TDS 6. Overflows from TDS 6 are routed through a ditch located within the containment berm for MS2-1 as shown on Exhibit 26.A-10. The profile for this ditch and storm water retention/spillway structure configuration is provided in Exhibit 26.A-12 along with the storm water retention structure and spillway design table for structures associated with TDS 6, TDS 7, and MS 2-1.

Typical design drawings and design tables for Road Ramp Ditch 2, DD 2-1 and CP 101 are provided in Exhibit 26.A-5 and 26.A-12. SEDCAD model results for both the 10-year, 24-hour event and the 25-year 6-hour event for Ramp Ditch 2 and associated Watershed 2 are provided in Attachment 26.A-E.

26.A.8.2.3 Ramp Ditch 3 and Watershed 3

Drawings that show Road Ramp Ditch 3 and associated drainages from Watershed 3 are provided in Exhibit 26.A-11. This ramp ditch collects drainage from WS 3-1, TDS 8 and MS 3-1 as shown in Exhibit 26.A-11. A diversion ditch and berm system, DD 3-1, diverts flow from WS3-1 around MS 3-1 and into Road Ramp Ditch 3. Overflows from the spillways constructed on the berms for TDS 8 and MS 3-1 flow into Road Ramp Ditch 3 as shown in Exhibit 26.A-11.

Typical design drawings and design tables for Road Ramp Ditch 3 and diversion ditch DD 3-1 are provided in Exhibit 26.A-12. The diversion ditch and the road ramp are designed to safely accommodate the peak flow from a 10-year, 24-hour precipitation event. The spillways on the containment berms are designed to pass the peak flow from the 25-year, 6-hour event assuming that the water is at the invert of the spillway at the beginning of the storm event. SEDCAD model results for both the 10-year, 24-hour event and the 25-year, 6-hour event for Ramp Ditch 3 and associated Watershed 3 are provided in Attachment 26.A-E.

26.A.8.2.4 Ramp Ditch 4 and Watershed 4

Drawings that show Road Ramp Ditch 4 and associated drainages from Watershed 4 are provided in Exhibit 26.A-11. This ramp ditch collects drainage from MS 4-1. Diversion ditch DD 4-1 conveys overflow from the berm associated with MS 4-1 to CP 102, which discharges into DD 4-1 (Road Ramp Ditch 4) as shown in Exhibit 26.A-11. Diversion ditch DD4-1 collects storm runoff from road drainage and from a small undisturbed area adjacent to the road in addition to overflows from the containment berm associated with MS4-1.

Typical design drawings and design tables for Road Ramp Ditch 4, DD 4-1 and CP 102 are provided in Exhibit 26.A-12. SEDCAD model results for the 10-year, 24- hour and 25-year, 6-hour events for Ramp Ditch 4 and associated Watershed 4 are provided in Attachment 26.A-E.

26.A.8.2.5 Ramp Ditch 5 and Watershed 5

Road Ramp Ditch 5 and associated diversion ditch DD5-1 are provided in Exhibit 26.A-11. This diversion ditch and ramp ditch collect drainage from Watershed WS 5-1 plus a small amount of drainage from the road adjacent to the ditch. The entire drainage area for WS 5 is 280.2 acres and could not be depicted on the 1:24,000 scale map (Exhibit 26.A-11), but it is shown in Exhibit 26.A-2. Diversion ditch DD 5-1 is constructed at grade adjacent to the road and diverts storm runoff from overland flow and small channels draining WS 5 from the Pinabete Diversion cut slope to Road Ramp Ditch 5 where it can be safely routed down the rock lined (6-inch D_{50}) ramp channel and into the main Pinabete Diversion as shown in Exhibit 26.A-11.

Typical design drawings and design tables for Road Ramp Ditch 5 and diversion ditch DD 5-1 are provided in Exhibit 26.A-12. SEDCAD model results for the 10-year 24-hour event for Ramp Ditch 5 and associated Watershed 5 are provided in Attachment 26.A-E.

26.A.8.3 Topdressing Stockpiles

Topdressing stockpiles will be located in the same general area as the material stockpiles, but the material will be separated. Diversion ditches will serve to protect the stockpiled topdressing material during and after *emplacement* (placement of topdressing material in the stockpile). The ditches will also serve to retain topdressing that may be eroded by storm water runoff within the stockpile. After emplacement of all topdressing material the berms will be modified to provide sufficient volume for the associated BMP.

These BMPs have been designed to store the 10-year, 24-hour storm when empty and to pass the 25-year, 6-hour storm when full. The berms have been designed to provide both the required storage and 1-foot of freeboard associated with the peak flow. A typical BMP design for the topdressing stockpiles is shown on Exhibit 26.A-12. The exhibit shows the design for a berm and/or ditch system with the required BMP storm water containment capacity and spillway layout. BMP design tables are provided in Exhibit 26.A-12. SEDCAD results for the 10-year, 24-hour and 25-year, 6-hour storm events associated with topdressing stockpiles are provided in Attachment 26.A-E. Refer to Section 25 of the NNP PAP for stabilization of topdressing stockpiles.

26.A.8.4 Excavation Material Stockpiles

During emplacement of excavation materials within the stockpiles, berms will be constructed to keep storm water from outside the stockpile from eroding materials from the stockpile and to prevent the uncontrolled release of storm water runoff and sediments from material stockpiles. After emplacement of all excavation material within the stockpiles, berms will be raised as needed to provide sufficient capacity behind the BMP berm at the spillway overflow elevation to contain the runoff from a 10-year, 24-hour storm. A spillway will be installed so that the invert of the spillway is the low point along the berm. This spillway is

designed to safely pass the peak flow from the 25-year, 6-hour event, assuming that the water within the bermed area is at the invert elevation of the spillway at the beginning of the storm event.

Excavation material stockpile MS1-2 includes an excavated sediment pond (Pond 1-1) to provide sufficient capacity to contain the volume from a 100-year, 6-hour event (Exhibits 26.A-9 and 26.A-12). Road culvert C1-2 functions as the spillway for containment Pond 1-1. Pond 1-1 has been designed with sufficient capacity to contain the entire volume of runoff from a 100-year 6-hour storm without overflowing the spillway because the culvert outlet for the pond is an enclosed spillway. This is the same design approach that has been used for the design of small ponds with enclosed spillways at the Navajo Mine. A typical design of the BMP sediment control structures for an excavation material stockpile is shown on Exhibit 26.A-12. This design shows the berm and/or ditch system with the required BMP storm water containment capacity and spillway layout. Design tables for the sediment control structures for each excavation material stockpile location are provided in Exhibit 26.A-12. The SEDCAD model results for the 10-year, 24-hour storm event flow and for the 25-year, 6-hour storm event for each topdressing stockpile are provided in Attachment 26.A-E.

26.A.8.5 Inspection and Maintenance

For inspection and maintenance of drainage and sediment control structures refer to Section 23, 25 and 26 of the NNP PAP.

26.A.9 COMPLIANCE

Designs for the Pinabete Diversion and the East Diversion have been prepared to safely pass the estimated peak flow from a 100-year, 6-hour storm event consistent with the OSM design requirements for permanent diversions. The diversions have also been designed to minimize adverse impacts to the hydrologic balance within the permit area and adjacent areas, to prevent material damage outside the permit area and to assure the safety of the public in accordance with performance requirements specified in 30 CFR 816.43.

Design evaluations demonstrate that the diversions can actually pass the peak flow from a 1000-year, 6-hour precipitation event without overflow into areas of active mining. As part of the design, a low height (less than 3-feet) segment of the berm on the East Diversion between Stations 18+00 and 24+70 has a design elevation of 5454.1 ft. amsl., which is approximately 1.4 feet in elevation lower than the top of the diversion berm including the diversion dike across the valley of Pinabete Arroyo. The lower elevation for this structure allows for a breach of the berm at this section in the unlikely event that a flood flow exceeding the 1000-year, 6-hour storm is ever experienced during the life of the Pinabete Diversion. A breach in the low height berm at this point along the East Diversion increases the likelihood that overflows from the breach would be much lower and more controlled than from a breach of the higher diversion dikes located across Pinabete Arroyo.

The PHC assessment in Section 41 includes an assessment of the effects the diversion of ephemeral stream flows from the Pinabete Arroyo drainage into No Name Arroyo, including potential effects on the channel characteristics and channel erosion within lower No Name Arroyo. As described in Section 5.3.1 of this Appendix, the Pinabete Diversion has been designed to attenuate the peak flows from design storm runoff events within the Pinabete Arroyo watershed upstream of the NMEP Site that would be conveyed through the Pinabete Diversion to the No Name Arroyo. The diversion design includes a gabion control structure and an increase in diversion widths at the “horseshoe excavation” near the beginning of the diversion. These design features provide very significant attenuation of peak flows for the 10-year, 6-hour event and very good results in comparison with alternatives for the 100-year, 6-hour design storm event.

The velocities associated with the 10-year, 6-hour storm for the diversion are well below erosive velocities of 6 fps. The velocities for the 100-year 6-hour event for the Easter Diversion are below erosion thresholds while the peak velocity for the 100-year, 6-hour event for the Pinabete Diversion slightly exceeds erosion thresholds. However, little erosion is likely to occur within the channel during this extreme event, because the natural sediment concentrations in the flows from Pinabete Arroyo entering the diversion are estimated to peak at 27,063 mg/L for the 100-year 6-hour event as indicated in the PHC analysis in Section 41 of the PAP.

A construction sequence is proposed that serves to prevent the additional contribution of sediment to stream flow outside the permit area during construction operations. Furthermore, a Drainage, Erosion and Sediment Control Plan has been developed to minimize the sources of pollutants in storm water runoff during construction and operation of the diversion using BMP to control erosion and sediment. The Drainage, Erosion and Sediment Control Plan describes the BMPs that shall be implemented to control erosion and sediment from these non-process areas in order to maintain compliance with the Western Alkaline Coal Mining Subcategory for mine discharges. Site-specific drainage and sediment controls have been designed for the estimated runoff from a 10-year, 24-hour precipitation events or larger using the SEDCAD Model. In many cases, the sediment control structures contain the entire runoff volume from a 10-year, 24-hour precipitation event plus 50% additional volume for sediment.

26.A.10 REFERENCES

Gellis, A.C., Hereford, R., Schumm, S.A., and Hayes, B.R., 1991, Channel evolution and hydrologic variations in the Colorado River basin--Factors influencing sediment and salt loads: Journal of Hydrology, v. 124, p. 317-344.

NOAA, 2008. Point Precipitation Frequency Estimates from NOAA Atlas 14 New Mexico 36.460744N - 108.525122W. Acquired 5/15/08 from http://hdsc.nws.noaa.gov/cgi-bin/hdsc/buildout.perl?type=pf&units=us&series=pd&statena.

Schumm, S.A., Harvey, M.D., and Watson, C.C., 1984, Incised channels: Littleton, Colo., Littleton Press, 200 p.

Dr. Richard C. Warner, University of Kentucky; SEDCAD™ 4 for Windows 95/98/NT/2000/Me/XP Design Manual And User's Guide; 6th printing-November 2006.

US Army Corps of Engineers Hydrologic Engineering Center; HEC-RAS River Analysis System User's Manual; Version 3.1; November 2002.

26.A.11 EXHIBITS

Pinabete Arroyo
Pinabete Watershed
Sanostee Wash
No Name Arroyo
Chaco River
Chaco 1 Tributary
Chaco 2 Tributary
Chaco 3 Tributary
No Name Watershed
No Name Arroyo
Brimhall Wash
Captain Tom Wash
Blanca Arroyo
NAVAJO INDIAN RESERVATION
No Name Impoundment
Pinabete
Huerfano
MONTEZUMA CREEK
NEW MEXICO
COLORADO
UTAH
ARIZONA

2,500,000 2,520,000 2,540,000 2,560,000 2,580,000 2,600,000
1,998,000 1,988,000 1,978,000 1,968,000 1,958,000 1,948,000 1,938,000

2,519,000 2,522,000 2,525,000 2,528,000 2,531,000
1,982,000 1,979,000 1,976,000

NN24SW1C (4.04)
NN24SW1A (86.85)
NN23SW08C (32.7)
NN22SW01C (46.99)
NN22SW01A (97.34)
NN59SW1 (41.03)
NN61SW1 (34.79)
NN54SW1 (42.85)
NN55SW1 (4.87)
NN65SW1 (22.11)
NN27SW1 (43.27)
NN57SW1 (4.74)
NN29SW01A (1.42)
NN26SW1 (13.26)
NN28SW1 (65.68)
NN21SW3A (168.37)
NN21SW2A (151.13)
NN48SW1 (8.81)
NN49SW1 (37.57)
NN47SW1 (29.27)
NN40SW1 (12.15)
NN51SW1 (4.82)
NN43SW1 (6.21)
NN38SW1 (66.38)
NN33SW1 (14.13)
NN11SW1 (53.96)
NN30SW1 (282.15)
S8 SW2 (552.99)
S8 SW1 (311.79)
S7SW1 (144.61)
S7 SW4 (11.9)

Projection Information:
State Plane
North American Datum 1983
New Mexico West
feet

0 0.5 1 2 3 4 Miles
1:40,000

Legend

- SEDCAD Structures
- Pinabete Diversion
- East Diversion
- Streams
- Area 4S Outline
- Area 5 Outline
- Permit Boundary
- Pre-Mining Watershed Boundaries
- Pre-Mining SEDCAD4 Subwatersheds (Acres)
- Ponds

NOT FOR CONSTRUCTION

REV No.	DATE	DRAFT BY	REVISION DESCRIPTION	ENG.	EQO.	PE. APPROVALS
0	4/23/09	CB	PAP SUBMITTAL	MK	AO	PJK 4-23-09

Exhibit 26.A-1

NORWEST Applied Hydrology

BHP NAVAJO COAL COMPANY

bhpbilliton

P.O.BOX 1717 FRUITLAND,NEW MEXICO 87416/PHONE 505-598-5861/FAX 505-598-3361

Navajo Mine Extension Project

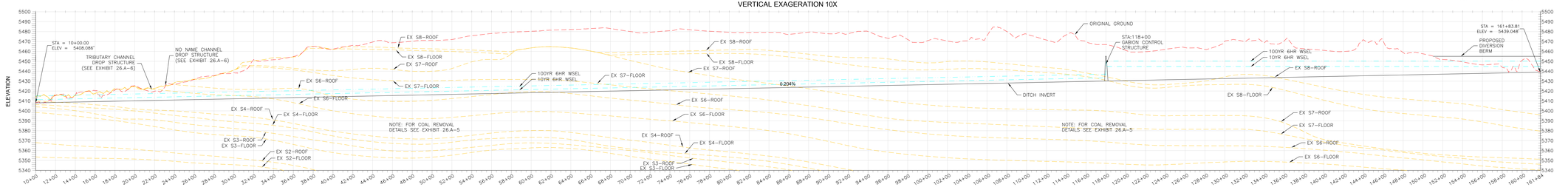
PINABETE DIVERSION CHANNEL WATERSHEDS WITH SEDCAD4 SUBWATERSHEDS

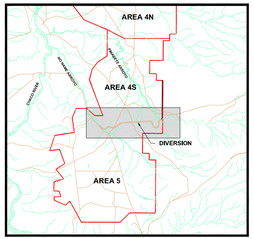
PREPARED BY: MDK	DRAWN BY: MDK	PAPER SIZE: ARCH D
APPROVED BY: CWB	DATE: 05/13/2009	

PROFILE: PINABETE DIVERSION

VERTICAL EXAGERATION 10X

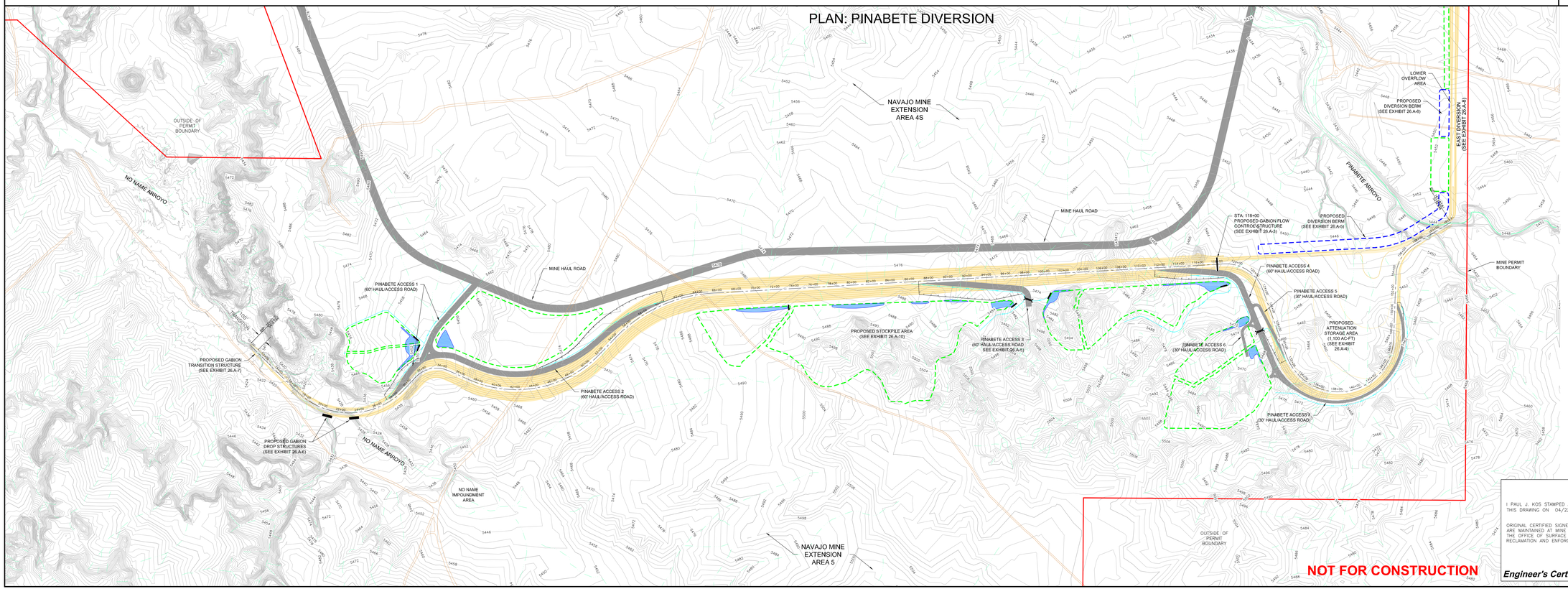
STA= STATION
ELEV= ELEVATION
WSEL= WATER SURFACE ELEVATION





VICINITY MAP
N.T.S.

PLAN: PINABETE DIVERSION



LEGEND

- MINE PERMIT BOUNDARY
- EXISTING ROADS
- EXISTING CONTOUR
- EXISTING DRAINAGE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- PROPOSED STOCKPILE
- PROPOSED DIVERSION BERM
- LIMITS OF ROAD GRADING
- PROPOSED DRAINAGE STRUCTURES (NOTED)
- 3mmC PROPOSED CULVERT
- PROPOSED ROAD
- CONTAINMENT BERM
- PROPOSED CLEAN WATER DITCH

NOTES

1. ALL ROADS THAT INTERSECT THE DIVERSION SHALL BE BARRICADED TO PREVENT ACCIDENTAL USE.
2. MAP SHOWS 2-FOOT CONTOUR INTERVAL.
3. RECOVERABLE COAL WITHIN THE DIVERSION EXCAVATION MAY BE REMOVED TO A PERMITTED COAL STOCKPILE. REMAINING COAL WILL BE STOCKPILED ON-SITE AND COVERED WITH AT LEAST 3 FEET OF NON-COMBUSTIBLE MATERIAL. ESTIMATED VOLUME OF COAL IS 594,000 Cu. Yd.
4. THE PROPOSED GABION FLOW CONTROL STRUCTURE AND UPSTREAM PROPOSED ATTENUATION STORAGE AREA ARE OPEN CHANNELS WITH NO STORAGE CAPACITY. THE 1,100 AC-FT CAPACITY INDICATED FOR THE PROPOSED ATTENUATION STORAGE AREA IS THE RESULT OF BACKWATER EFFECTS DURING THE 100-YR 6-HR STORM.
5. SEE EXHIBIT 26.A-9,10,11 AND 12 FOR CULVERT AND DITCH CALL OUTS AND SIZING.
6. PRIOR TO CONSTRUCTION OF THE DIVERSION, GEOTECHNICAL STABILITY CALCULATIONS SHALL BE PERFORMED USING SITE SPECIFIC TESTING DATA BELOW ALL CONTAINMENT BERMS AND WHERE EXCAVATION/FILL DEPTHS ARE GREATER THAN 30 FEET TO VERIFY THAT BENCHING IS NOT NECESSARY FOR SLOPE STABILITY.

SURVEY INFORMATION

THE MAIN MINE SURVEY WAS PERFORMED BY AERO-GRAPHICS IN MARCH 2008 AND WAS FLOWN BASED ON A 10-FOOT CONTOUR INTERVAL. THE NO NAME ARROYO SURVEY WAS PERFORMED BY AERO-GRAPHICS IN JULY 2008 AND WAS FLOWN BASED ON A 2-FOOT CONTOUR INTERVAL. SUPPLEMENTAL SURVEYS WERE PERFORMED BY BNCC FOR THE NO NAME IMPOUNDMENT IN JULY 2008, THE NO NAME ARROYO FROM JULY TO AUGUST 2008 AND THE EAST END OF THE PROPOSED DIVERSION IN MAY 2008. ALL BEARINGS AND DISTANCES ARE GRID BASED IN U.S. SURVEY FEET, HORIZONTAL DATUM IS NAD83 BASED ON NEW MEXICO COORDINATE SYSTEM WEST, ZONE 3003. VERTICAL DATUM IS NAVD88, GEOID 03.

400 0 400
SCALE IN FEET

NO.	DATE	BY	REVISION DESCRIPTION	CHK'D BY	APPROVED BY
0	4-22-09	MK	PAP SUBMITTAL	MK	MK, PJK 4-22-09

EXHIBIT 26.A-2

NORWEST CORPORATION

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FRUITLAND, NEW MEXICO 87416
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NAVAJO MINE EXTENSION PROJECT

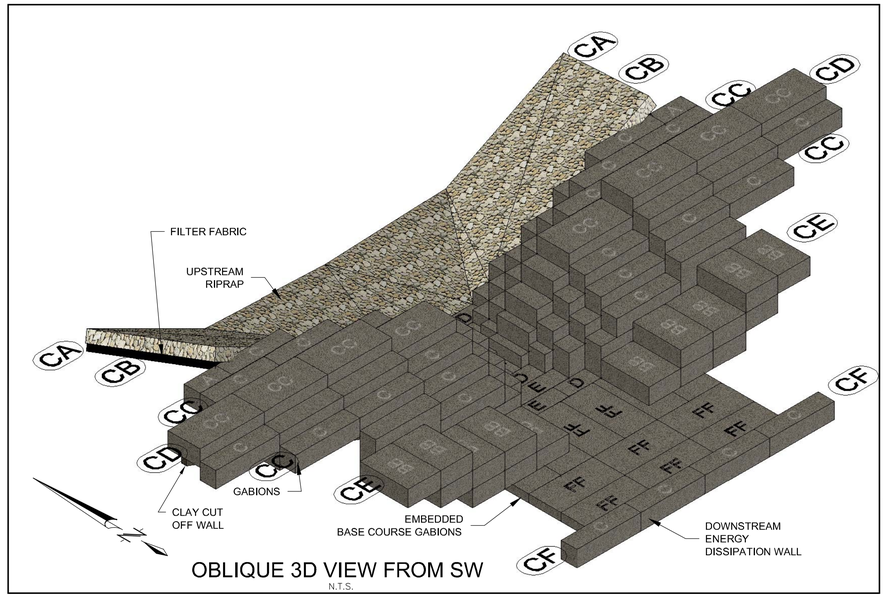
PINABETE DIVERSION CHANNEL
PLAN & PROFILE

PREPARED BY	WSK	DRAWN BY	JS	SCALE:	1" = 400'
APPROVED BY		DATE	Apr 23, 2009		

I, PAUL J. KOS STAMPED AND SIGNED THIS DRAWING ON 04/22/2009

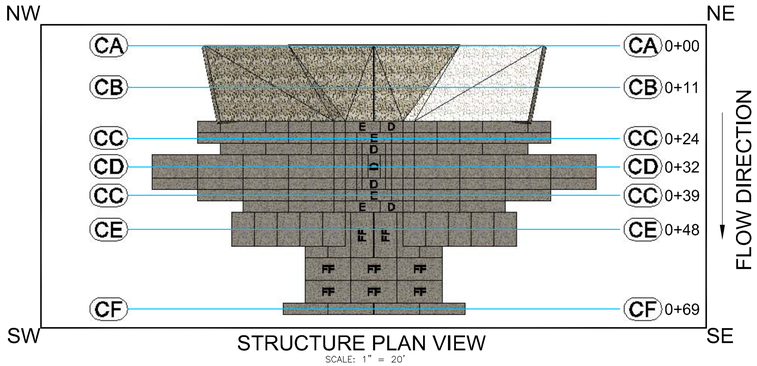
ORIGINAL CERTIFIED SIGNED EXHIBITS ARE MAINTAINED AT MINE SITE AND AT THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT.

Engineer's Certification



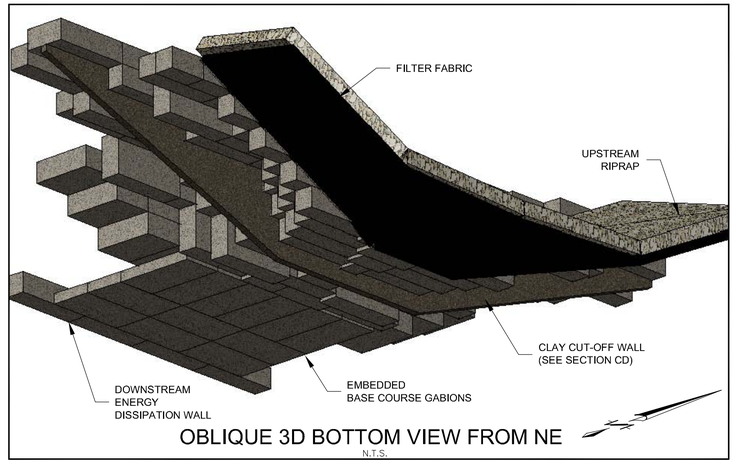
OBLIQUE 3D VIEW FROM SW

N.T.S.



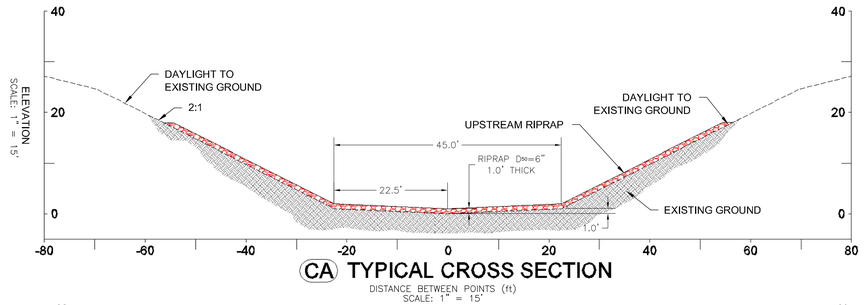
STRUCTURE PLAN VIEW

SCALE: 1" = 20'



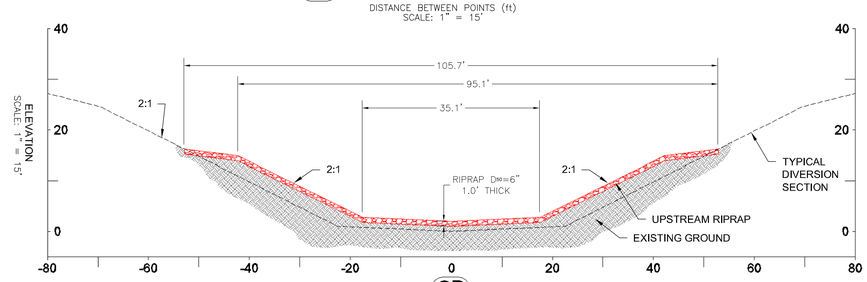
OBLIQUE 3D BOTTOM VIEW FROM NE

N.T.S.



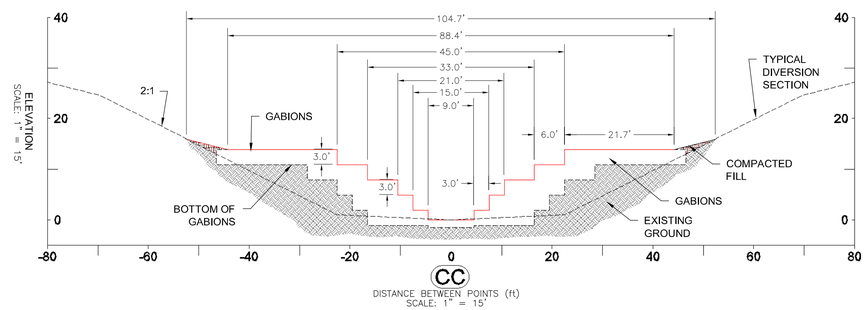
CA TYPICAL CROSS SECTION

DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'



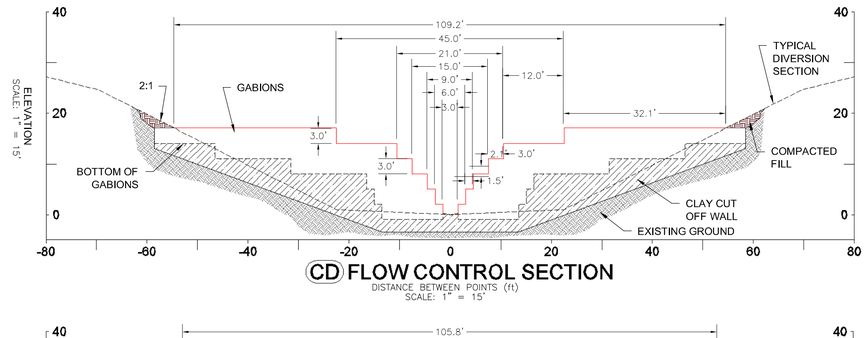
CB

DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'



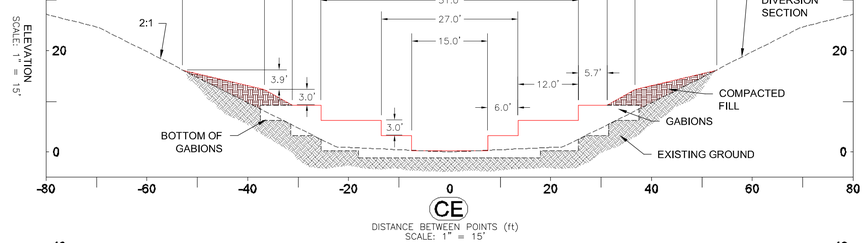
CC

DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'



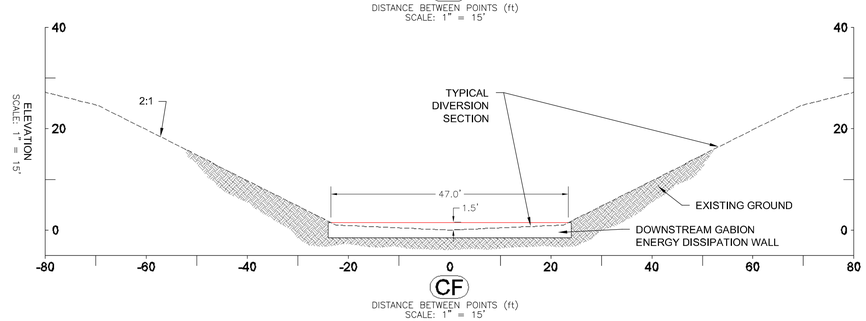
CD FLOW CONTROL SECTION

DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'



CE

DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'



CF

DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'

STRUCTURE STAGE-DISCHARGE TABLE AT FLOW CONTROL SECTION (CD)

ELEVATION 0 IS EQUIVELANT TO 5430.00' ABOVE MEAN SEA LEVEL

ELEVATION (ft)	Q (cfs)	ELEVATION (ft)	Q (cfs)
0	0	13	422
1	4	14	516
2	8	15	594
3	17	16	807
4	31	17	1,021
5	45	18	1,168
6	66	19	1,720
7	93	20	2,309
8	129	21	2,928
9	168	22	3,768
10	210	23	4,836
11	263	24	6,151
12	329	25	7,872

GABION BASKET SIZES

LETTER CODE	LENGTH (FT)	WIDTH (FT)	HEIGHT (FT)	VOLUME (CY)
A	6	3	3	2
BB	9	6	3	6
C	12	3	3	4
CC	12	6	3	8
D	6	3	1.5	1
E	9	3	1.5	1.5
FF	12	6	1.5	4

I PAUL J. KOS STAMPED AND SIGNED THIS DRAWING ON 04/22/2009

ORIGINAL CERTIFIED SIGNED EXHIBITS ARE MAINTAINED AT MINE SITE AND AT THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT.

Engineer's Certification

NOTES

1. A GEOTEXTILE LAYER SHALL BE PLACED AT THE INTERFACE BETWEEN THE GABION BASKET AND THE SOIL.
2. ALL ROADS THAT INTERSECT THE DIVERSION SHALL BE BARRICADED TO PREVENT ACCIDENTAL USE.
3. THE PROPOSED GABION FLOW CONTROL STRUCTURE AND UPSTREAM PROPOSED ATTENUATION STORAGE AREA ARE OPEN CHANNELS WITH NO STORAGE CAPACITY. THE 1,100 AC-FT CAPACITY INDICATED FOR THE PROPOSED ATTENUATION STORAGE AREA IS THE RESULT OF BACKWATER AFFECTS DURING THE 100-YR STORM.
4. GABION DESIGNATION IS BASED ON STANDARD GABION BASKET SIZING.
5. GABION BASKETS SHALL BE INSTALLED FOLLOWING THE MANUFACTURERS RECOMMENDATIONS AND GUIDELINES.

NOT FOR CONSTRUCTION

REV. NO.	DATE	DRAFT. BY	REVISION DESCRIPTION	PREP. BY	E.O.	P.E.	DATE CLEARED
							APPROVALS
0	4-22-09	MK	PAP SUBMITTAL	MK	AO	PJK	4-22-09

EXHIBIT 26.A-3

NORWEST Applied Hydrology

BHP NAVAJO COAL COMPANY

bhpbilliton

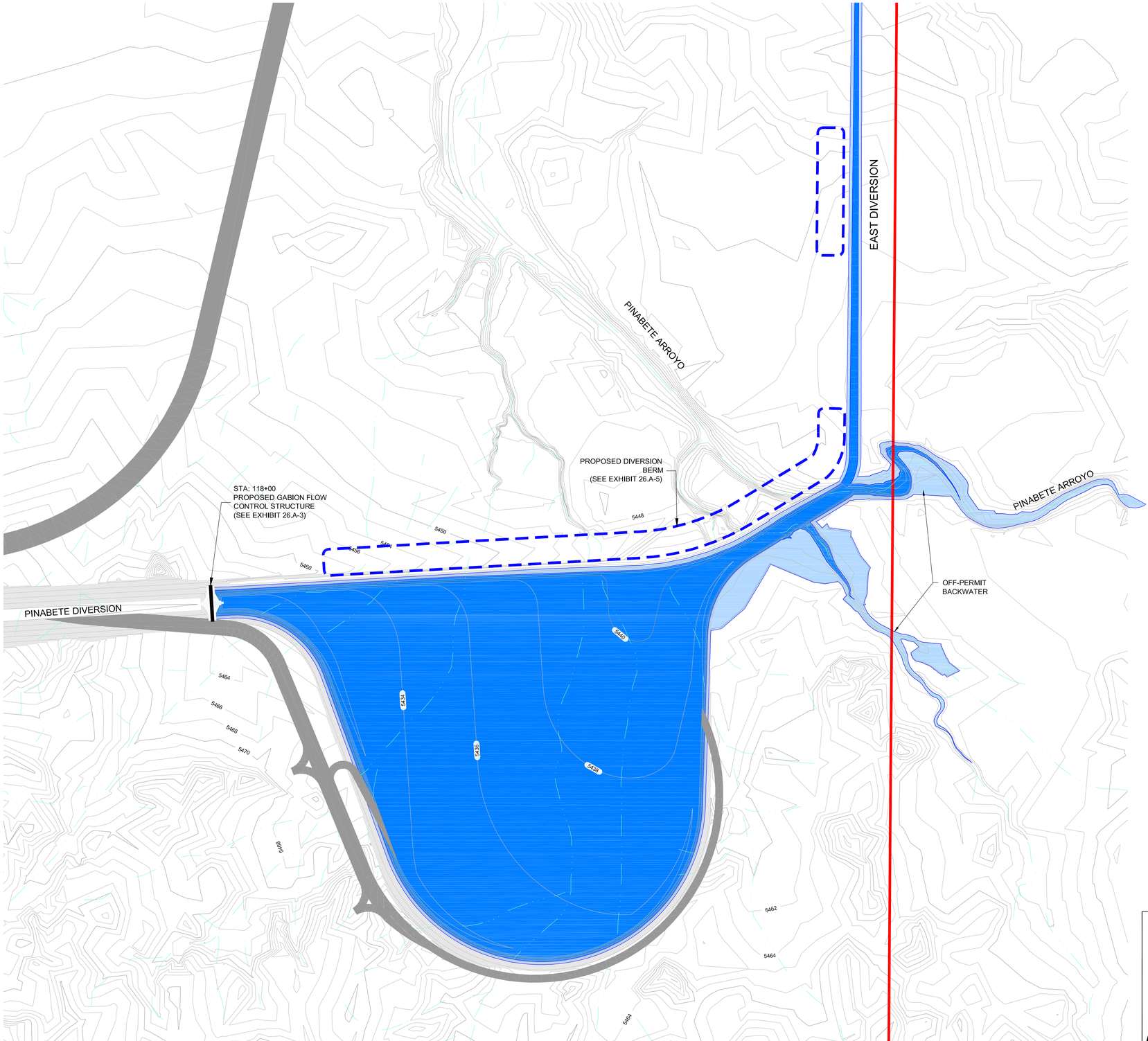
P.O. BOX 1717
FRUITLAND, NEW MEXICO 87416
PHONE(505)598-4200
Fax(505)598-4322

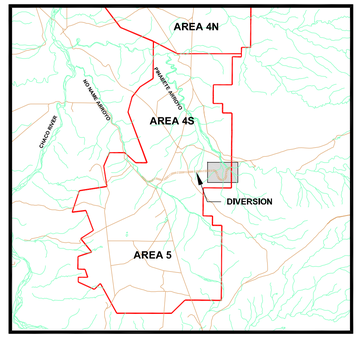
NAVAJO MINE EXTENSION PROJECT

PINABETE DIVERSION CHANNEL
FLOW CONTROL STRUCTURE
TYPICAL CROSS SECTION & DETAILS

PREPARED BY MSK	DRAWN BY JS	SCALE: AS SHOWN
APPROVED BY	DATE Apr 21, 2009	

Apr 21, 2009 - 13:56am U:\Navajo Mine Extension\F Drive\Permit\26.A-3 Flow Structure.dwg





VICINITY MAP
N.T.S.

NOTES

1. THE PROPOSED GABION FLOW CONTROL STRUCTURE AND UPSTREAM PROPOSED ATTENUATION STORAGE AREA ARE OPEN CHANNELS WITH NO STORAGE CAPACITY. THE 1,100 AC-FT CAPACITY INDICATED FOR THE PROPOSED ATTENUATION STORAGE AREA IS THE RESULT OF BACKWATER EFFECTS DURING THE 100-YR, 6-HR STORM.

SURVEY INFORMATION

THE MAIN MINE SURVEY WAS PERFORMED BY AERO-GRAPHICS IN MARCH 2008 AND WAS FLOWN BASED ON A 10-FOOT CONTOUR INTERVAL. THE NO NAME ARROYO SURVEY WAS PERFORMED BY AERO-GRAPHICS IN JULY 2008 AND WAS FLOWN BASED ON A 2-FOOT CONTOUR INTERVAL. SUPPLEMENTAL SURVEYS WERE PERFORMED BY BNCC FOR THE NO NAME IMPOUNDMENT IN JULY 2008, THE NO NAME ARROYO FROM JULY TO AUGUST 2008 AND THE EAST END OF THE PROPOSED DIVERSION IN MAY 2008. ALL BEARINGS AND DISTANCES ARE GRID BASED IN U.S. SURVEY FEET. HORIZONTAL DATUM IS NAD83 BASED ON NEW MEXICO COORDINATE SYSTEM WEST, ZONE 3003. VERTICAL DATUM IS NAVD88, GEOID 03.

LEGEND

- 100YR, 6HR WSEL
- 10YR, 6HR WSEL
- MINE PERMIT BOUNDARY
- PROPOSED DIVERSION BERM
- PROPOSED DRAINAGE STRUCTURE
- PROPOSED ACCESS ROADS

200 0 200
SCALE IN FEET

REV. NO.	DATE	DRAFT. BY	REVISION DESCRIPTION	PREP'D BY	E.G.	P.J.	DATE CERTIFIED
0	4-22-09	MK	PAP SUBMITTAL	MK	AO	PJK	4-22-09

APPROVALS

EXHIBIT 26.A-4

NORWEST Applied Hydrology

BHP NAVAJO COAL COMPANY

bhpbilliton

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NAVAJO MINE EXTENSION PROJECT

PINABETE DIVERSION CHANNEL
BACKWATER AREA
PLAN VIEW

PREPARED BY MSK	DRAWN BY JS	SCALE: 1" = 200'
APPROVED BY	DATE Apr 21, 2009	

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ORIGINAL CERTIFIED SIGNED EXHIBITS ARE MAINTAINED AT MINE SITE AND AT THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT.

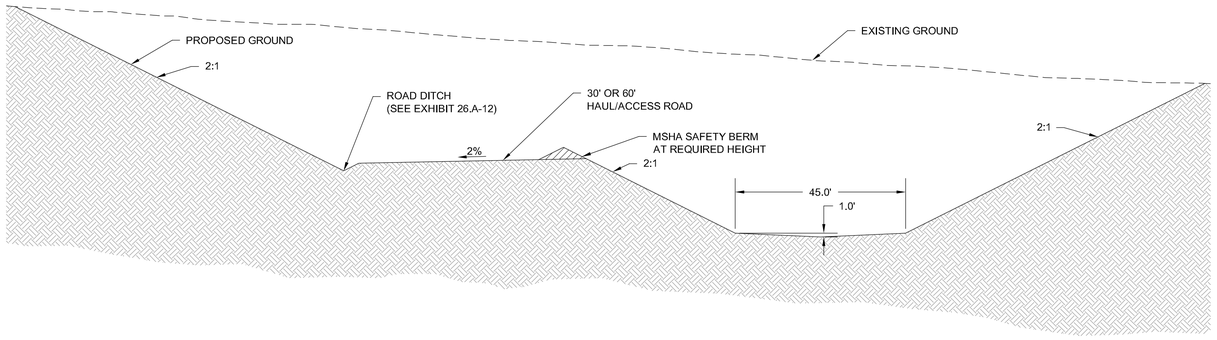
Engineer's Certification

NOT FOR CONSTRUCTION

Apr 21, 2009 - 11:04am\U:\Navajo Mine Extension\PF Drawings\Exhibit 26\26.A-4 CBExpansionBackwater.dwg

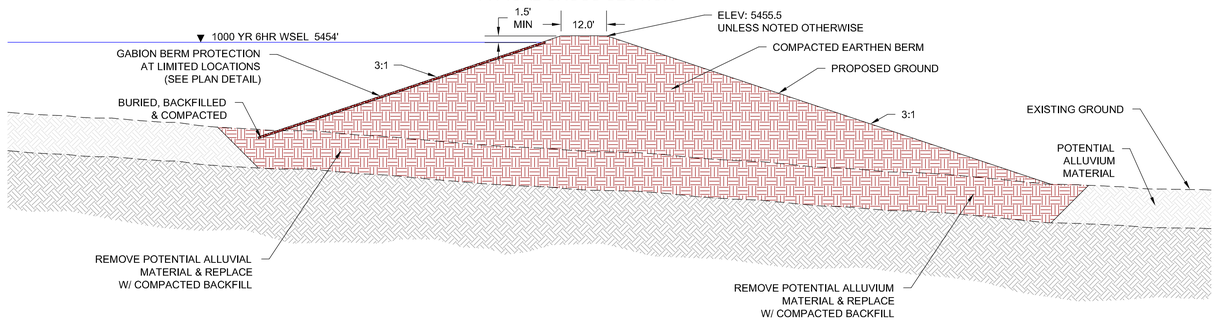
CHANNEL & ROAD RAMP

TYPICAL CROSS SECTION



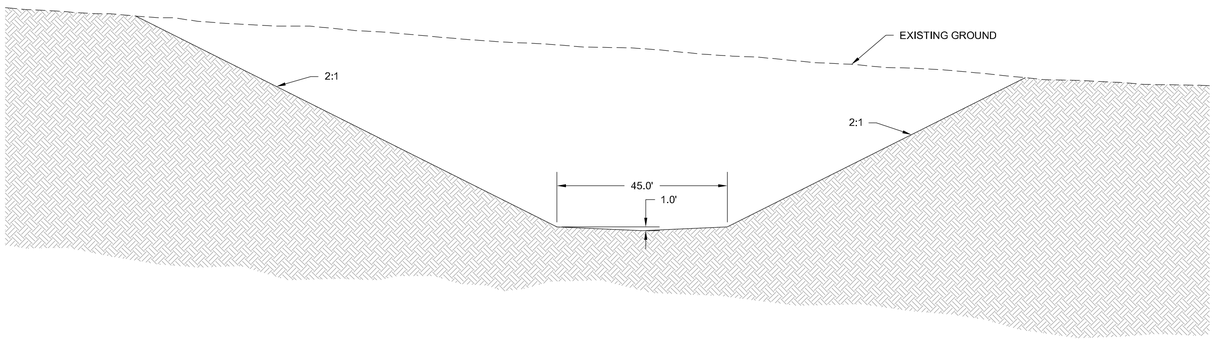
DIVERSION BERM

TYPICAL CROSS SECTION



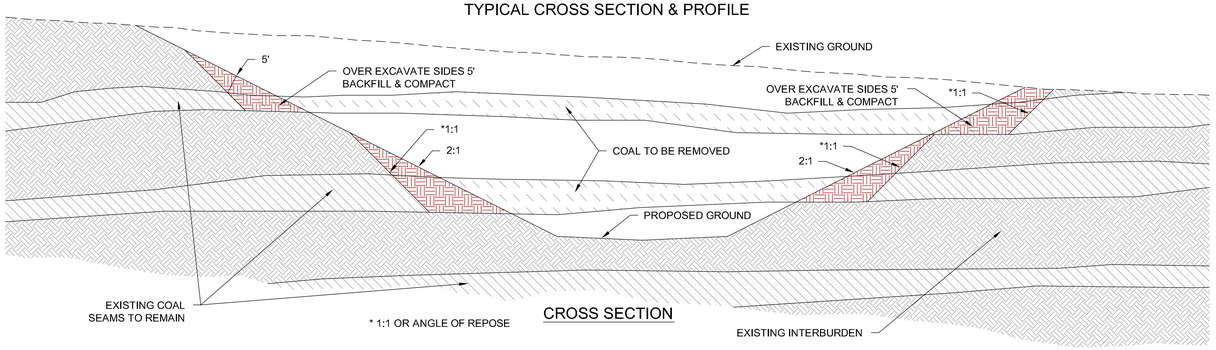
DIVERSION

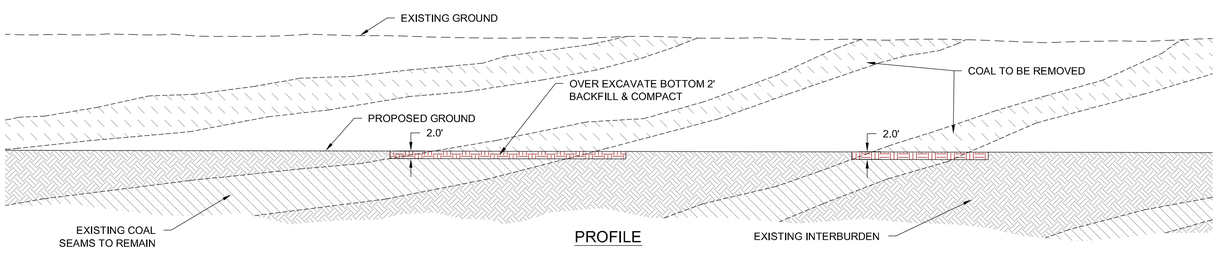
TYPICAL CROSS SECTION



COAL REMOVAL

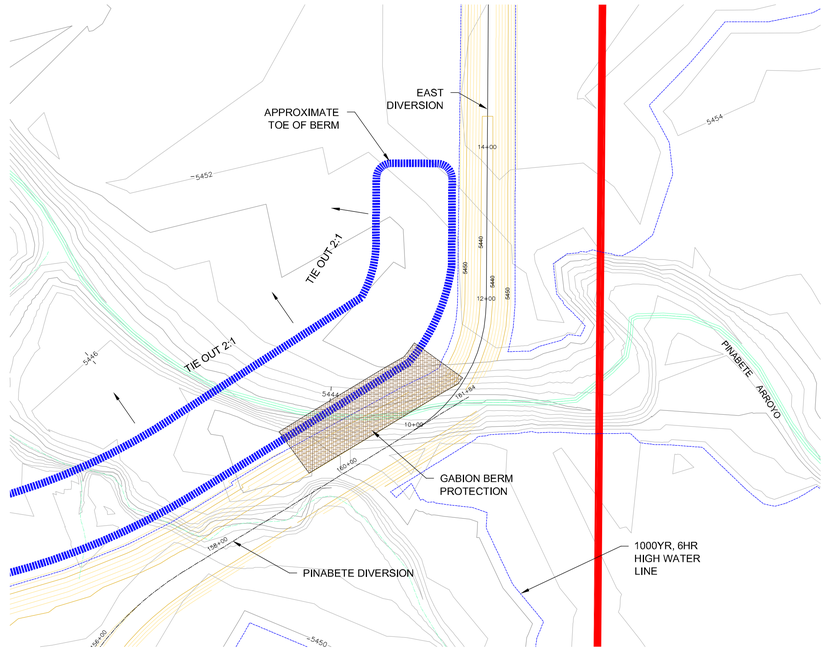
TYPICAL CROSS SECTION & PROFILE





DIVERSION CONNECTIONS

PLAN DETAIL



LEGEND

- MINE PERMIT BOUNDARY
- EXISTING CONTOUR
- EXISTING DRAINAGE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- PROPOSED DIVERSION BERM
- 1000YR 6HR HIGH WATER LINE
- PROPOSED GABION AT EROSION PROTECTION
- COMPACTED FILL

NOTES

1. ALL ROADS THAT INTERSECT THE DIVERSION SHALL BE BARRICADED TO PREVENT ACCIDENTAL USE.
2. MAP SHOWS 2-FOOT CONTOUR INTERVAL.
3. SALVAGEABLE COAL WITH IN THE DIVERSION EXCAVATION MAY BE REMOVED AND STOCKPILED OFF-SITE. REMAINING COAL WILL BE STOCKPILED ON-SITE AND COVERED WITH AT LEAST 3-FEET OF NON-COAL MATERIAL. ESTIMATED VOLUME OF COAL IS 594,000 Cu. Yd.
4. THE PROPOSED GABION FLOW CONTROL STRUCTURE AND UPSTREAM PROPOSED ATTENUATION STORAGE AREA ARE OPEN CHANNELS WITH NO STORAGE CAPACITY. THE 1,100 AC-FT CAPACITY INDICATED FOR THE PROPOSED ATTENUATION STORAGE AREA IS THE RESULT OF BACKWATER EFFECTS DURING THE 100-YR, 6-HR STORM.
6. PRIOR TO CONSTRUCTION OF THE DIVERSION, GEOTECHNICAL STABILITY CALCULATIONS SHALL BE PERFORMED USING SITE SPECIFIC TESTING DATA BELOW ALL CONTAINMENT BERMS AND WHERE EXCAVATION/FILL DEPTHS ARE GREATER THAN 30 FEET TO VERIFY THAT BENCHING IS NOT NECESSARY FOR SLOPE STABILITY. (SEE EXHIBIT 26.A-2)

SURVEY INFORMATION

THE MAIN MINE SURVEY WAS PERFORMED BY AERO-GRAPHICS IN MARCH 2008 AND WAS FLOWN BASED ON A 10-FOOT CONTOUR INTERVAL. THE NO NAME ARROYO SURVEY WAS PERFORMED BY AERO-GRAPHICS IN JULY 2008 AND WAS FLOWN BASED ON A 2-FOOT CONTOUR INTERVAL. SUPPLEMENTAL SURVEYS WERE PERFORMED BY BNCC FOR THE NO NAME IMPOUNDMENT IN JULY 2008, THE NO NAME ARROYO FROM JULY TO AUGUST 2008 AND THE EAST END OF THE PROPOSED DIVERSION IN MAY 2008. ALL BEARINGS AND DISTANCES ARE GRID BASED IN U.S. SURVEY FEET. HORIZONTAL DATUM IS NAD83 BASED ON NEW MEXICO COORDINATE SYSTEM WEST, ZONE 3003. VERTICAL DATUM IS NAVD88, GEOID 03.

NOT FOR CONSTRUCTION

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Engineer's Certification

20 0 20
SCALE IN FEET

N

REV. No.	DATE	DRAFT. BY	REVISION DESCRIPTION	PREP. BY	C.G.	P.E.	APPROVALS DATE CERTIFIED
0	4-22-09	MK	PAP SUBMITTAL	MK	AO	PJK	4-22-09

EXHIBIT 26.A-5

NORWEST Applied Hydrology

BHP NAVAJO COAL COMPANY

bhpbilliton

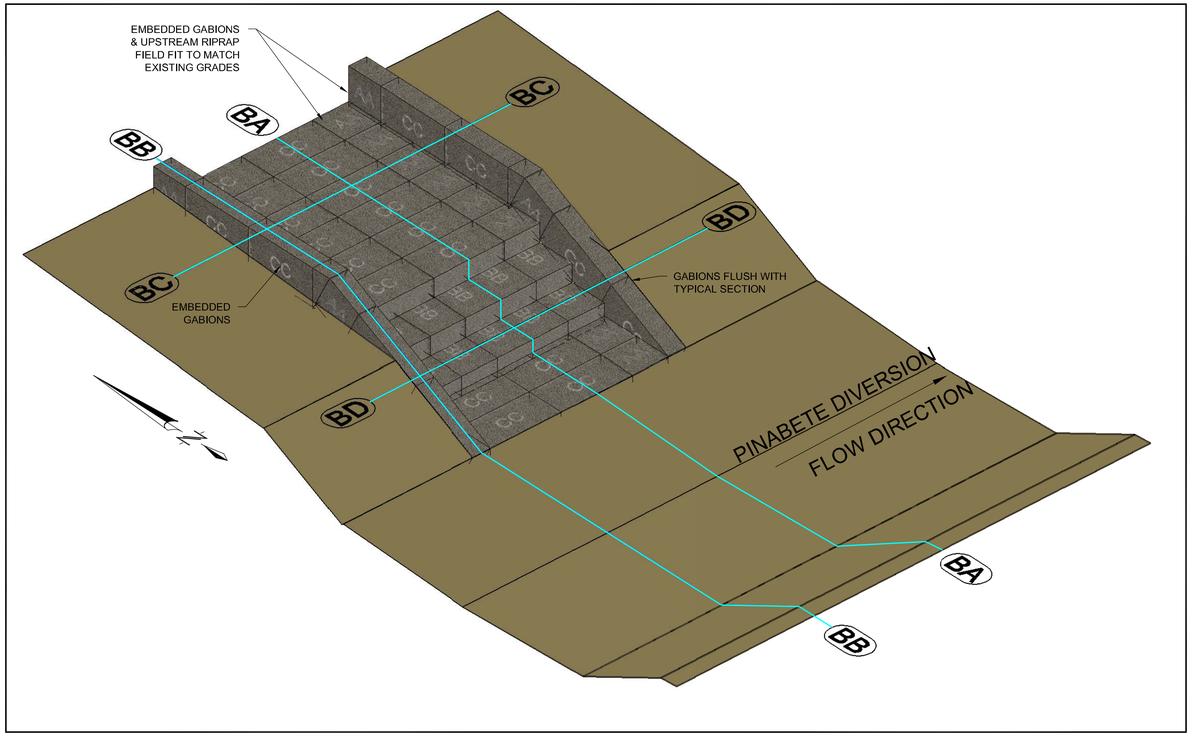
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PHONE(505)598-4200
Fax(505)598-4322

NAVAJO MINE EXTENSION PROJECT

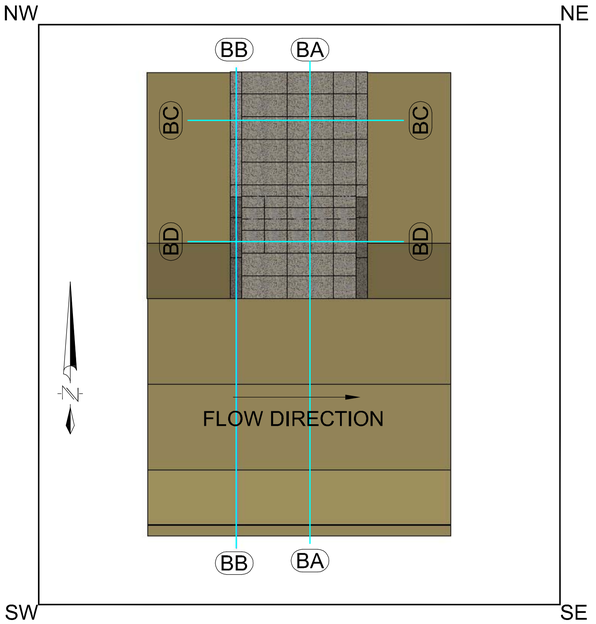
PINABETE DIVERSION CHANNEL TYPICAL CHANNEL & BERM DETAILS

PREPARED BY MSK	DRAWN BY JS	SCALE: 1" = 20'
APPROVED BY	DATE Apr 23, 2009	

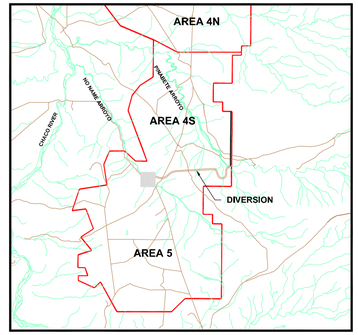
Apr 23, 2009 - 2:09pm\\Navajo Mine Extension\P Drive\Permit\26.A-5 Entrainment Drill.dwg



TYPICAL OBLIQUE 3D VIEW FROM SW
N.T.S.



TYPICAL STRUCTURE PLAN VIEW
N.T.S.



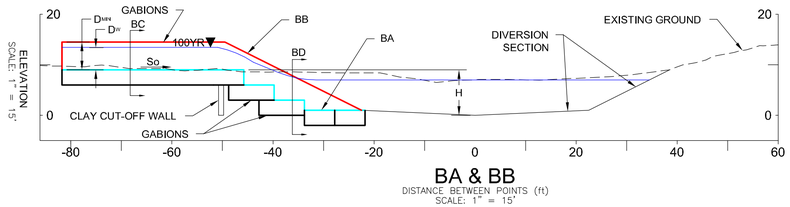
VICINITY MAP
N.T.S.

NOTES

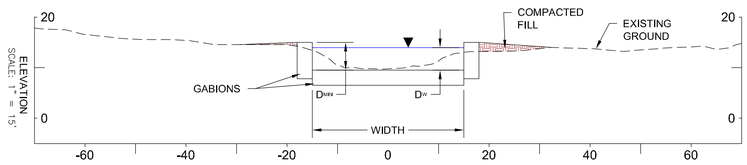
1. A GEOTEXTILE LAYER SHALL BE PLACED AT THE INTERFACE BETWEEN THE GABION BASKET AND THE SOIL.
2. GABION DESIGNATION IS BASED ON GABION BASKET STANDARD SIZING.
3. GABION LETTER DESIGNATION IS BASED ON STANDARD GABION BASKET SIZING.

SURVEY INFORMATION

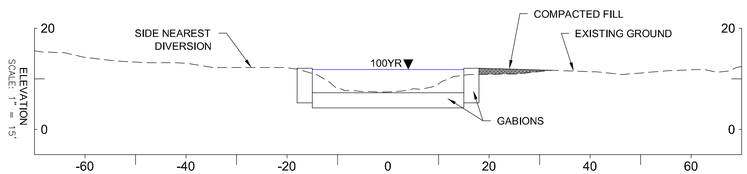
THE MAIN MINE SURVEY WAS PERFORMED BY AERO-GRAPHICS IN MARCH 2008 AND WAS FLOWN BASED ON A 10-FOOT CONTOUR INTERVAL. THE NO NAME ARROYO SURVEY WAS PERFORMED BY AERO-GRAPHICS IN JULY 2008 AND WAS FLOWN BASED ON A 2-FOOT CONTOUR INTERVAL. SUPPLEMENTAL SURVEYS WERE PERFORMED BY BNCC FOR THE NO NAME IMPOUNDMENT IN JULY 2008, THE NO NAME ARROYO FROM JULY TO AUGUST 2008 AND THE EAST END OF THE PROPOSED DIVERSION IN MAY 2008. ALL BEARINGS AND DISTANCES ARE GRID BASED IN U.S. SURVEY FEET, HORIZONTAL DATUM IS NAD83 BASED ON NEW MEXICO COORDINATE SYSTEM WEST, ZONE 3003. VERTICAL DATUM IS NAVD88, GEOID 03.



BA & BB
DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'



BC CROSS SECTION
DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'

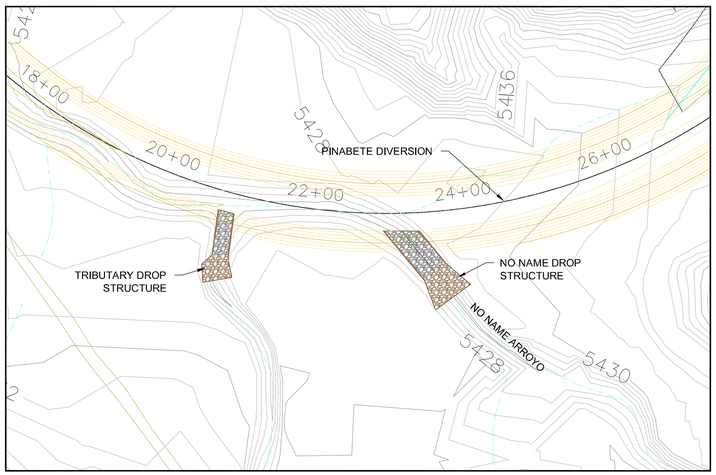


BD CROSS SECTION
DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'

DROP STRUCTURE DESIGN TABLE

STRUCTURE	Q_{100} FLOW (CFS)	S_O SLOPE (%)	W WIDTH (FT)	D_{MIN} DEPTH (FT)	D_W 100YR WATER DEPTH (FT)	H HEIGHT (FT)
NO NAME	937	0.53	30.0	5.5	4.44	8.4
TRIBUTARY	328	1.19	15.0	4.0	2.89	8.8

So = SLOPE ABOVE DROP STRUCTURE



PLAN VIEW
SCALE: 1" = 100'

LEGEND

- EXISTING ROADS
- EXISTING CONTOUR
- EXISTING DRAINAGE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- PROPOSED DROP STRUCTURE
- PROPOSED RIPRAP

100 0 100
SCALE IN FEET

I PAUL J. KOS STAMPED AND SIGNED THIS DRAWING ON 04/22/2009

ORIGINAL CERTIFIED SIGNED EXHIBITS ARE MAINTAINED AT MINE SITE AND AT THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT.

Engineer's Certification

REV. No.	DATE	DRAFT. BY	REVISION DESCRIPTION	PREP. BY	S.S.	P.E.	DATE CERTIFIED
0	4-22-09	MK	PAP SUBMITTAL	MK	AO	PJK	4-22-09

APPROVALS

EXHIBIT 26.A-6

NORWEST Applied Hydrology

BHP NAVAJO COAL COMPANY

bhpbilliton

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FRUITLAND, NEW MEXICO 87416

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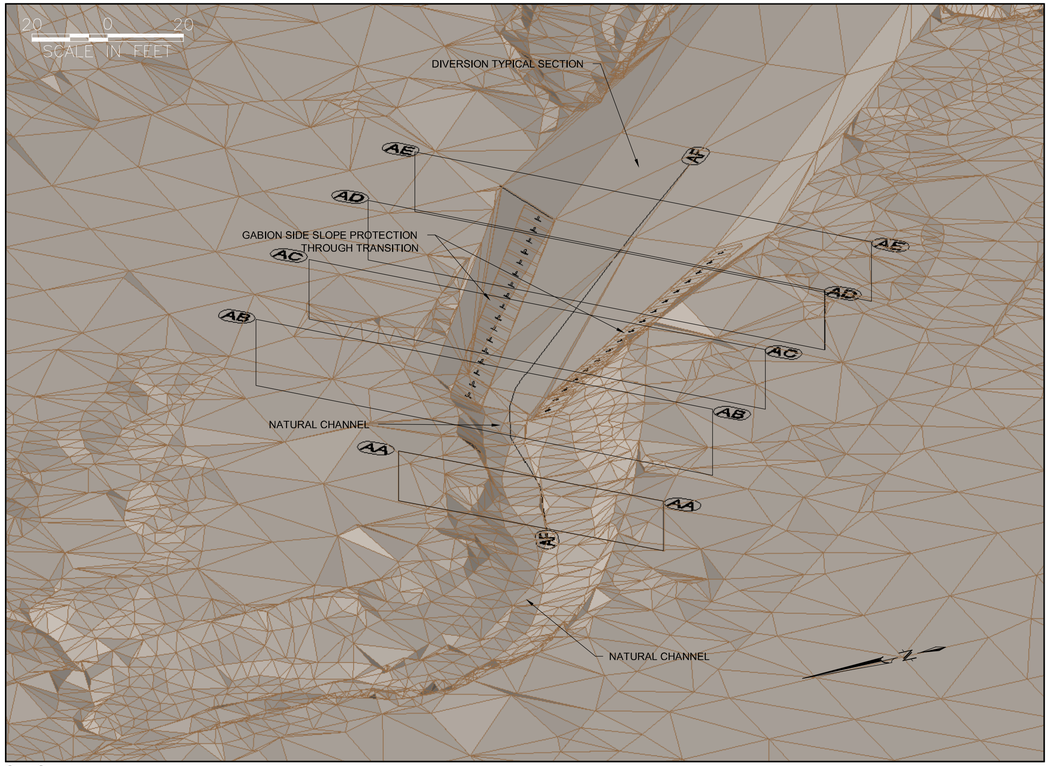
NAVAJO MINE EXTENSION PROJECT

PINABETE DIVERSION CHANNEL
DROP STRUCTURE
TYPICAL CROSS SECTION & DETAIL

PREPARED BY MSK	DRAWN BY JS	SCALE: AS SHOWN
APPROVED BY	DATE Apr 21, 2009	

Apr 21, 2009 - 11:09am U:\Navajo Mine\Mine Extension\P Drive\Mine Plans\PDS-5 Drop Structure.dwg

NOT FOR CONSTRUCTION

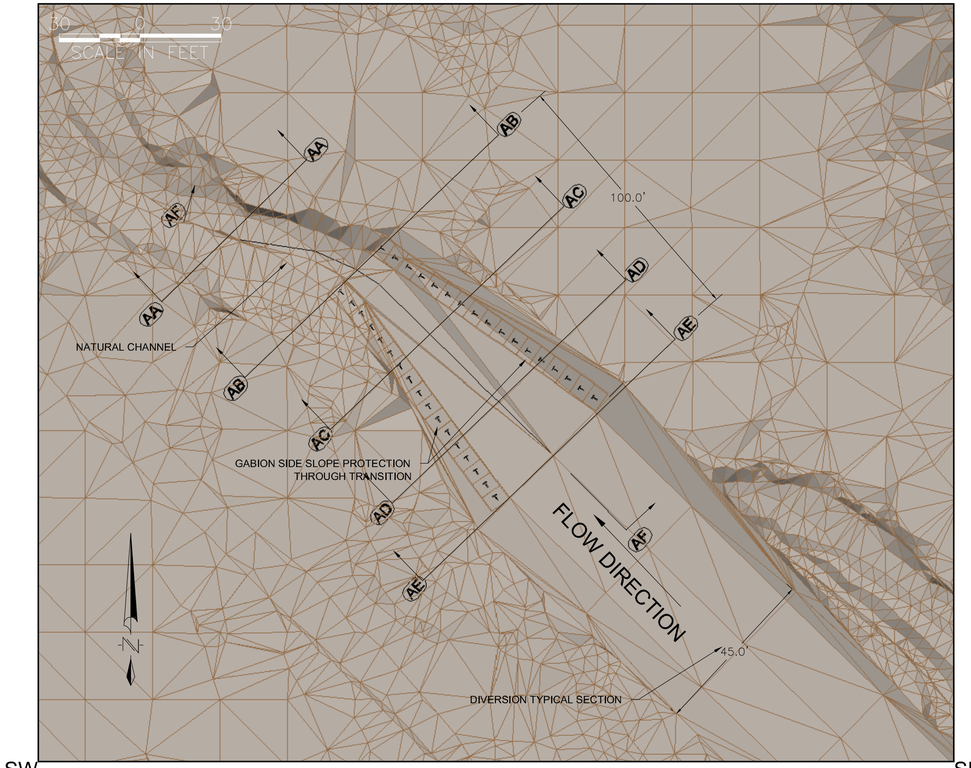


OBLIQUE 3D VIEW OF CHANNEL FROM NW

AS SHOWN

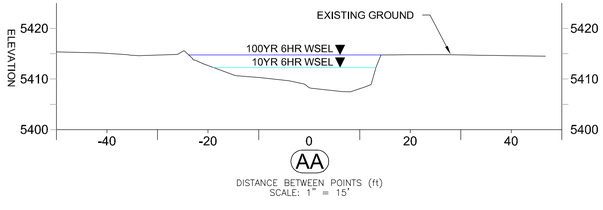
NOTES

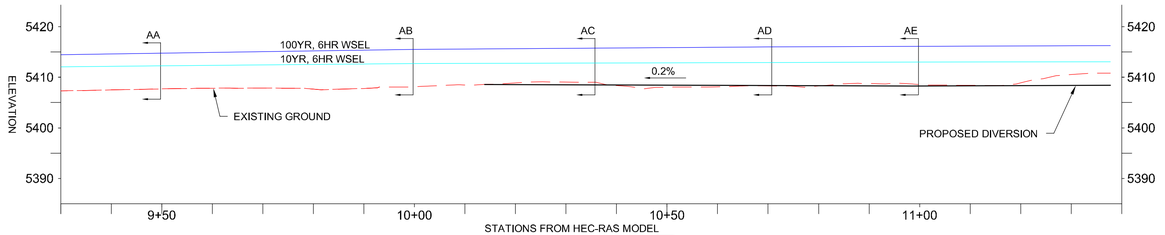
1. GABION DESIGNATION "T" IS BASED ON STANDARD GABION BASKET SIZING.



STRUCTURE PLAN VIEW

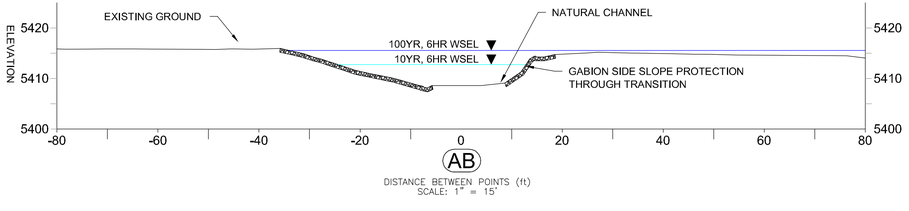
AS SHOWN

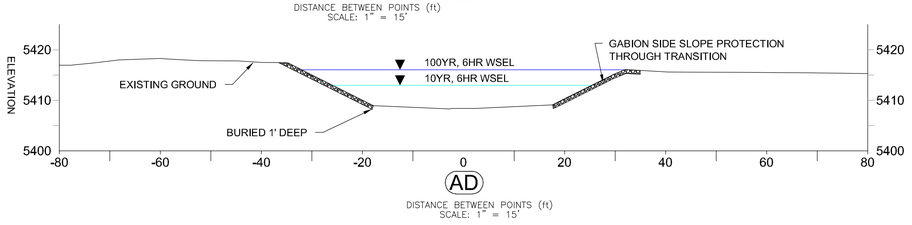


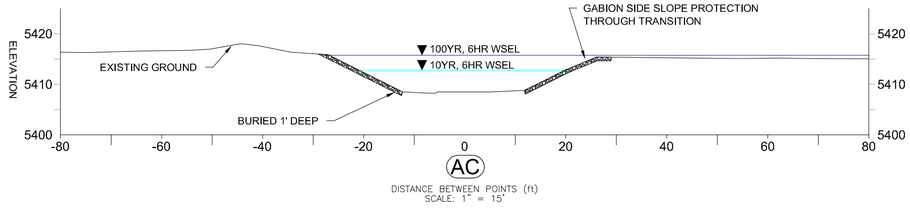


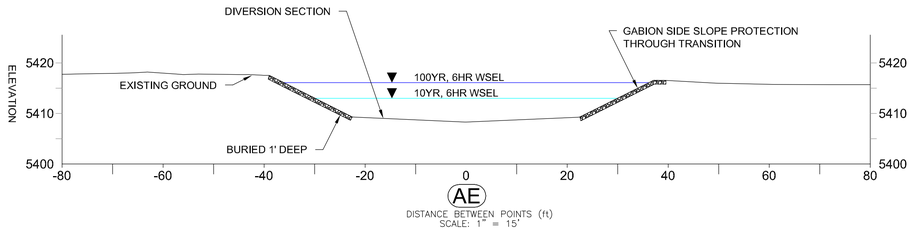
TRANSITION PROFILE (AF)

DISTANCE BETWEEN POINTS (ft)
SCALE: 1" = 15'









SURVEY INFORMATION

THE MAIN MINE SURVEY WAS PERFORMED BY AERO-GRAPHICS IN MARCH 2008 AND WAS FLOWN BASED ON A 10-FOOT CONTOUR INTERVAL. THE NO NAME ARROYO SURVEY WAS PERFORMED BY AERO-GRAPHICS IN JULY 2008 AND WAS FLOWN BASED ON A 2-FOOT CONTOUR INTERVAL. SUPPLEMENTAL SURVEYS WERE PERFORMED BY BNCC FOR THE NO NAME IMPOUNDMENT IN JULY 2008, THE NO NAME ARROYO FROM JULY TO AUGUST 2008 AND THE EAST END OF THE PROPOSED DIVERSION IN MAY 2008. ALL BEARINGS AND DISTANCES ARE GRID BASED IN U.S. SURVEY FEET. HORIZONTAL DATUM IS NAD83 BASED ON NEW MEXICO COORDINATE SYSTEM WEST, ZONE 3003. VERTICAL DATUM IS NAVD88, GEOID 03.

I PAUL J. KOS STAMPED AND SIGNED THIS DRAWING ON 04/22/2009

ORIGINAL CERTIFIED SIGNED EXHIBITS ARE MAINTAINED AT MINE SITE AND AT THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT.

Engineer's Certification

NOT FOR CONSTRUCTION

REV. No.	DATE	DRAFT. BY	REVISION DESCRIPTION	PREP. BY	E.O.	P.E.	DATE CERTIFIED
0	4-22-09	MK	PAP SUBMITTAL	MK	AO	PJK	4-22-09

APPROVALS

EXHIBIT 26.A-7

NORWEST Applied Hydrology

BHP NAVAJO COAL COMPANY

bhpbilliton

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FRUITLAND, NEW MEXICO 87416

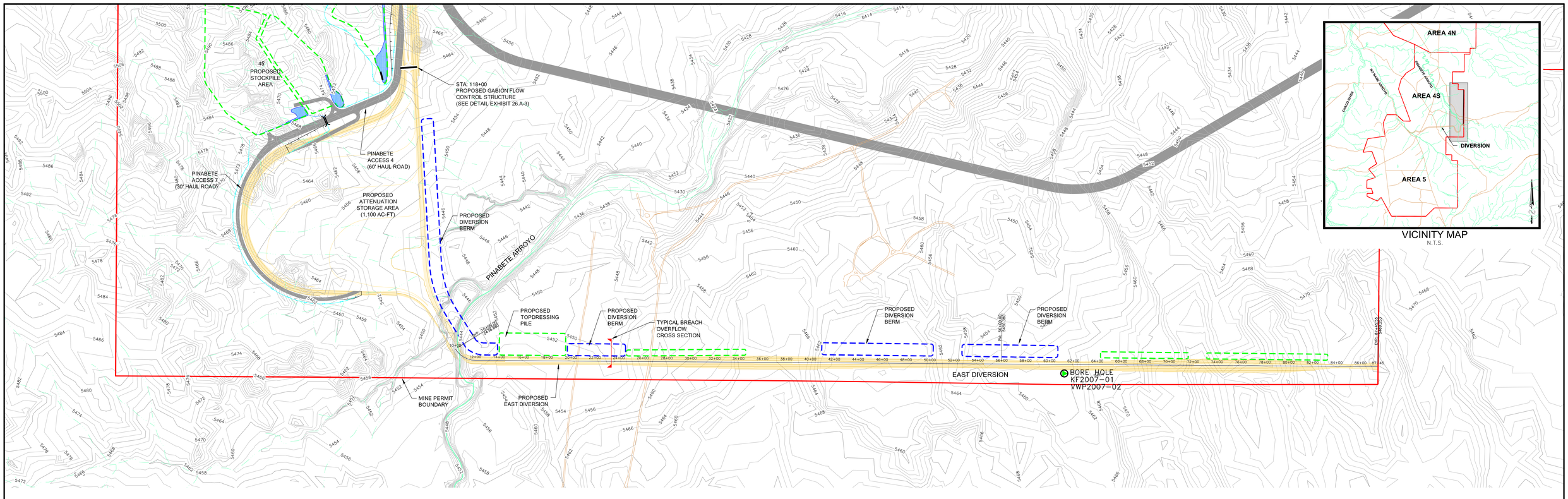
PHONE(505)598-4200
Fax(505)598-4322

NAVAJO MINE EXTENSION PROJECT

PINABETE DIVERSION CHANNEL
NO NAME TRANSITION
DETAIL

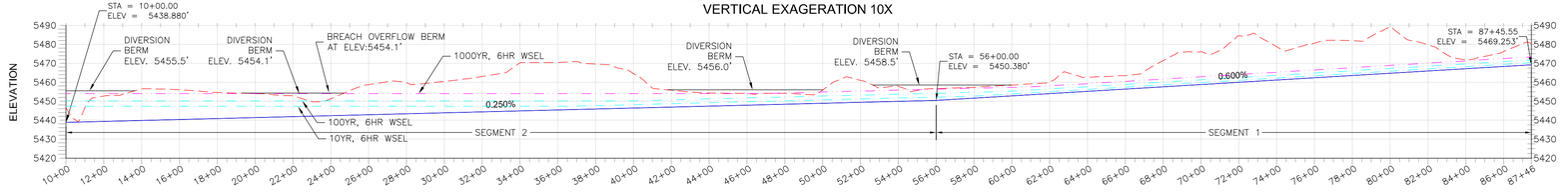
PREPARED BY MSK	DRAWN BY JS	SCALE: AS SHOWN
APPROVED BY	DATE Apr 21, 2009	

Apr 21, 2009 - 11:13am\N:\Navajo Mine Extension\P. Diversion Permit\26.A-7 Transition Details.dwg



VICINITY MAP
N.T.S.

EAST DIVERSION
VERTICAL EXAGERATION 10X



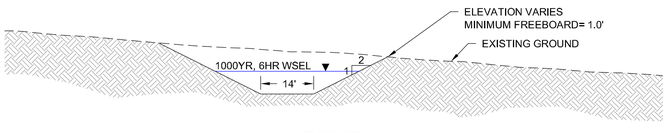
EAST DIVERSION DESIGN TABLE

SEGMENT	STATION START	STATION END	WIDTH (FT)	SIDE SLOPES	SLOPE (%)	FLOW 100YR (CFS)	DEPTH (FT)	VELOCITY (FPS)
1	56+00	87+46	14	2H:1V	0.60	236	2.5	5.0
2	10+00	56+00	14	2H:1V	0.25	372	3.8	4.5

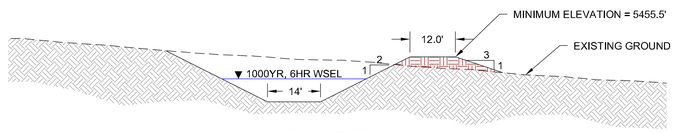
LEGEND

- MINE PERMIT BOUNDARY
- EXISTING ROADS
- EXISTING CONTOUR
- EXISTING DRAINAGE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- PROPOSED STOCKPILE
- PROPOSED DIVERSION BERM
- LIMITS OF ROAD GRADING
- PROPOSED CULVERT
- PROPOSED ROAD
- PROPOSED CLEAN WATER DITCH
- BOREHOLE

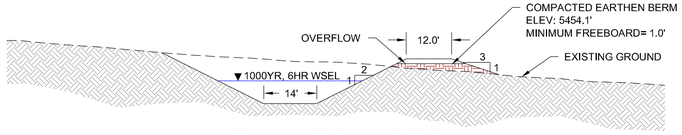
EAST DIVERSION
TYPICAL CROSS SECTIONS



CUT SECTION



FILL SECTION



BREACH OVERFLOW SECTION

NOTES

1. ALL ROADS THAT INTERSECT THE DIVERSION SHALL BE BARRICADED TO PREVENT ACCIDENTAL USE.
2. MAP SHOWS 2-FOOT CONTOUR INTERVAL.
3. SALVAGEABLE COAL WITH IN THE DIVERSION EXCAVATION MAY BE REMOVED AND STOCKPILED OFF-SITE. REMAINING COAL WILL BE STOCKPILED ON-SITE AND COVERED WITH AT LEAST 3 FEET OF NON-COMBUSTIBLE MATERIAL. ESTIMATED VOLUME OF COAL IS 594,000 Cu. Yd.
4. THE PROPOSED GABION FLOW CONTROL STRUCTURE AND UPSTREAM PROPOSED ATTENUATION STORAGE AREA ARE OPEN CHANNELS WITH NO STORAGE CAPACITY. THE 1,100 AC-FT CAPACITY INDICATED FOR THE PROPOSED ATTENUATION STORAGE AREA IS THE RESULT OF BACKWATER EFFECTS DURING THE 100-YR 6-HR STORM.
5. SEE EXHIBIT 26.A-9,10,11 AND 12 FOR CULVERT AND DITCH CALL OUTS AND SIZING.
6. PRIOR TO CONSTRUCTION OF THE DIVERSION, GEOTECHNICAL STABILITY CALCULATIONS SHALL BE PERFORMED USING SITE SPECIFIC TESTING DATA BELOW ALL CONTAINMENT BERMS AND WHERE EXCAVATION/FILL DEPTHS ARE GREATER THAN 30 FEET TO VERIFY THAT BENCHING IS NOT NECESSARY FOR SLOPE STABILITY. (SEE EXHIBIT 26.A-2)

SURVEY INFORMATION

THE MAIN MINE SURVEY WAS PERFORMED BY AERO-GRAPHICS IN MARCH 2008 AND WAS FLOWN BASED ON A 10-FOOT CONTOUR INTERVAL. THE NO NAME ARROYO SURVEY WAS PERFORMED BY AERO-GRAPHICS IN JULY 2008 AND WAS FLOWN BASED ON A 2-FOOT CONTOUR INTERVAL. SUPPLEMENTAL SURVEYS WERE PERFORMED BY BNCC FOR THE NO NAME IMPOUNDMENT IN JULY 2008, THE NO NAME ARROYO FROM JULY TO AUGUST 2008 AND THE EAST END OF THE PROPOSED DIVERSION IN MAY 2008. ALL BEARINGS AND DISTANCES ARE GRID BASED IN U.S. SURVEY FEET. HORIZONTAL DATUM IS NAD83 BASED ON NEW MEXICO COORDINATE SYSTEM WEST, ZONE 3003. VERTICAL DATUM IS NAVD88, GEOID 03.

NOT FOR CONSTRUCTION

400 0 400
SCALE IN FEET

REV. No.	DATE	DRAFT. BY	REVISION DESCRIPTION	PREP. BY	C.O.	P.E.	APPROVED DATE
0	4-22-09	MK	PAP SUBMITTAL	MK	AO	PJK	4-22-09

APPROVALS

EXHIBIT 26.A-8

NORWEST Applied Hydrology

BHP NAVAJO COAL COMPANY

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NAVAJO MINE EXTENSION PROJECT

PINABETE DIVERSION CHANNEL
EAST DIVERSION
PLAN & PROFILE

PREPARED BY MSK	DRAWN BY JS	SCALE: 1" = 400'
APPROVED BY	DATE Apr 23, 2009	

I PAUL J. KOS STAMPED AND SIGNED THIS DRAWING ON 04/22/2009

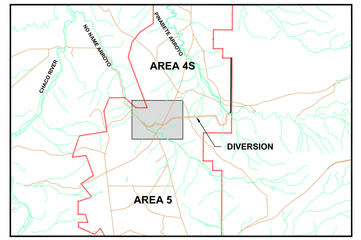
ORIGINAL CERTIFIED SIGNED EXHIBITS ARE MAINTAINED AT MINE SITE AND AT THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT.

Engineer's Certification

Apr 23, 2009 - 2:00pm N:\Mine\Navajo Mine Extension\P Chandler\Item#26\A-2 Pinabete Diversion.dwg

LEGEND

- MINE PERMIT BOUNDARY
- EXISTING ROADS
- EXISTING CONTOUR
- EXISTING DRAINAGE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- PROPOSED CLEAN WATER DIVERSION DITCH
- PROPOSED STOCKPILE BMP DITCH
- PROPOSED STOCKPILE BERM
- PROPOSED SPILLWAY STRUCTURE
- MAJOR WATERSHED BOUNDARY
- SUB-WATERSHED BOUNDARY
- LIMITS OF ROAD GRADING
- ROAD
- CONTAINMENT BERM
- PROPOSED CULVERT



VICINITY MAP N.T.S.

WS 1
WS 1-1

NO NAME ARROYO

DD 1-1
DD 1-2
DD 1-3

MS 1-1
PROPOSED MATERIAL STOCKPILE AREA

CB 1-1
CB 1-2

TDS 5
PROPOSED TOPDRESSING STOCKPILE AREA

POND 1-1

MS 1-2
PROPOSED MATERIAL STOCKPILE AREA

PINABETE ACCESS 1
PINABETE ACCESS 2
PINABETE ACCESS 1

RAMP DITCH 1

DROP STRUCTURES

NO NAME IMPOUNDMENT AREA

EDGE OF DIVERSION BASED ON 60' ROAD WIDTH

MATCHLINE EXHIBIT 26.A-9

MATCHLINE EXHIBIT 26.A-9

200 0 200
SCALE IN FEET

NOT FOR CONSTRUCTION

NOTES

ALL ROADS THAT INTERSECT THE DIVERSION SHALL BE BARRICADED TO PREVENT ACCIDENTAL USE.

MAP SHOWS 2-FOOT CONTOUR INTERVAL.

FOR PIPE, CULVERT, DITCH AND SPILLWAY IN FORMATION SEE EXHIBIT 26.A-12

SURVEY INFORMATION

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0	6-15-09	MK	PAP SUBMITTAL	MK	AO	PJK	6-15-09

EXHIBIT 26.A-9

NORWEST Applied Hydrology

BHP NAVAJO COAL COMPANY

bhpbilliton

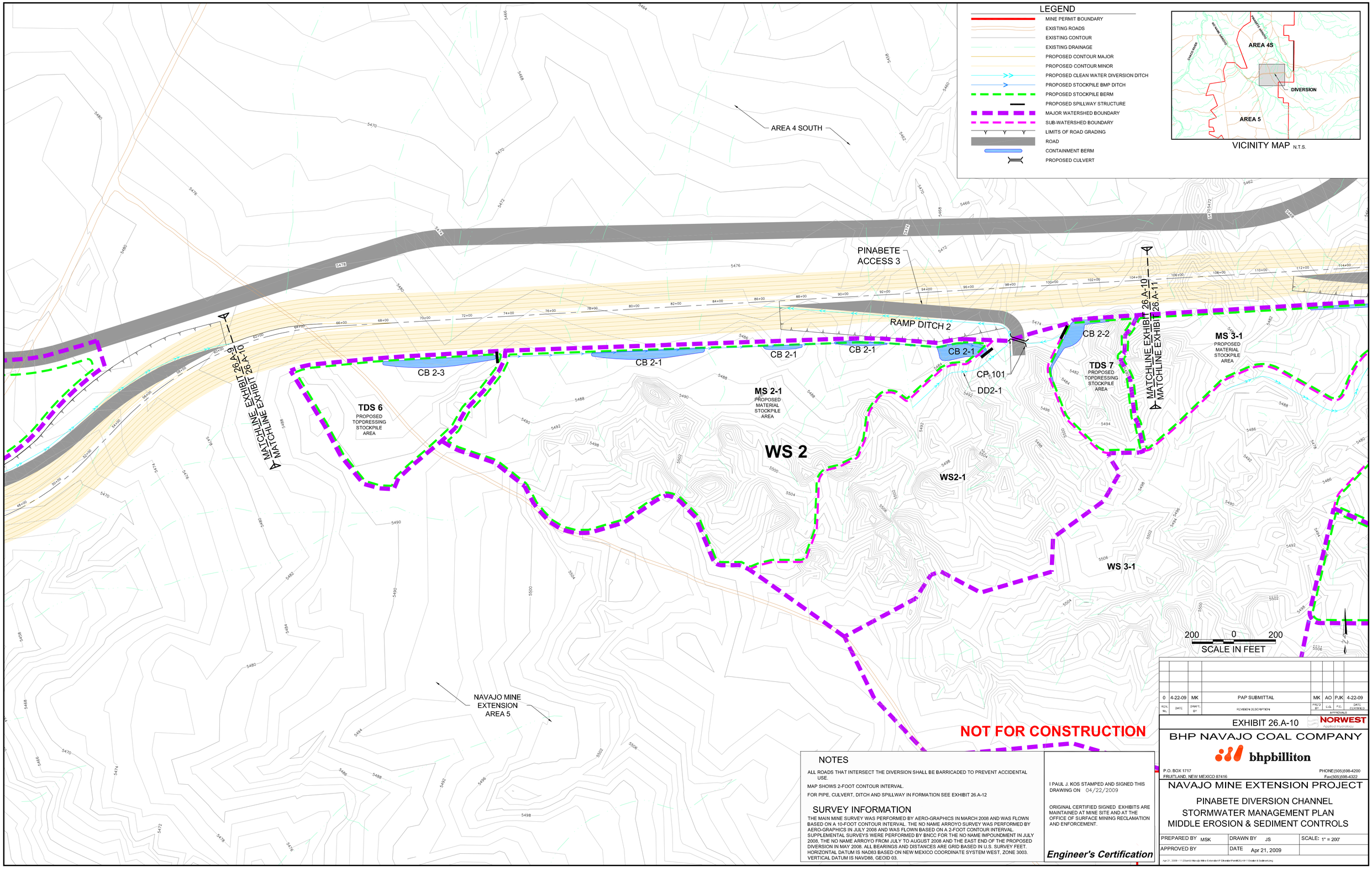
P.O. BOX 1717
FRUITLAND, NEW MEXICO 87416
PHONE(505)598-4200
Fax(505)598-4322

NAVAJO MINE EXTENSION PROJECT

PINABETE DIVERSION CHANNEL STORMWATER MANAGEMENT PLAN WEST EROSION & SEDIMENT CONTROLS

PREPARED BY	MSK	DRAWN BY	JS	SCALE:	1" = 200'
APPROVED BY		DATE	Jun 15, 2009		

Jun 15, 2009 - 11:41:14(m)(C:\Navajo Mine Extension\P Diversions\Permit\26.A-9-11 Erosion & Sed\Sheet.dwg



NOTES

ALL ROADS THAT INTERSECT THE DIVERSION SHALL BE BARRICADED TO PREVENT ACCIDENTAL USE.

MAP SHOWS 2-FOOT CONTOUR INTERVAL.

FOR PIPE, CULVERT, DITCH AND SPILLWAY IN FORMATION SEE EXHIBIT 26.A-12

SURVEY INFORMATION

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I PAUL J. KOS STAMPED AND SIGNED THIS DRAWING ON 04/22/2009

ORIGINAL CERTIFIED SIGNED EXHIBITS ARE MAINTAINED AT MINE SITE AND AT THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT.

Engineer's Certification

REV. No.	DATE	DRAFT. BY	REVISION DESCRIPTION	PREP. BY	E.G.	P.E.	DATE CENTERED
0	4-22-09	MK	PAP SUBMITTAL	MK	AO	PJK	4-22-09

APPROVALS

NORWEST Applied Hydrology

EXHIBIT 26.A-10

BHP NAVAJO COAL COMPANY

bhpbilliton

P.O. BOX 1717 FRUITLAND, NEW MEXICO 87416

PHONE:(505)598-4200 Fax:(505)598-4322

NAVAJO MINE EXTENSION PROJECT

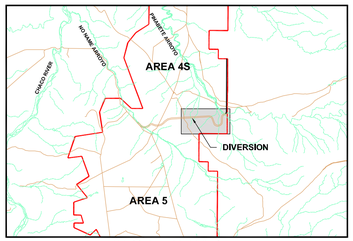
PINABETE DIVERSION CHANNEL STORMWATER MANAGEMENT PLAN MIDDLE EROSION & SEDIMENT CONTROLS

PREPARED BY MSK	DRAWN BY JS	SCALE: 1" = 200'
APPROVED BY	DATE Apr 21, 2009	

Apr 21, 2009 - 11:22am U:\Navajo Mine Extension\P Diversion Plan\EXA-9-11 Erosion & Sediment.dwg

LEGEND

- MINE PERMIT BOUNDARY
- EXISTING ROADS
- EXISTING CONTOUR
- EXISTING DRAINAGE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- PROPOSED CLEAN WATER DIVERSION DITCH
- PROPOSED STOCKPILE BMP DITCH
- PROPOSED STOCKPILE BERM
- PROPOSED DIVERSION BERM
- PROPOSED SPILLWAY STRUCTURE
- MAJOR WATERSHED BOUNDARY
- SUB-WATERSHED BOUNDARY
- LIMITS OF ROAD GRADING
- ROAD
- CONTAINMENT BERM
- PROPOSED CULVERT



VICINITY MAP N.T.S.

PINABETE ARROYO

PINABETE ACCESS 3

PINABETE ACCESS 4

PINABETE ACCESS 5

PINABETE ACCESS 6

PINABETE ACCESS 7

RAMP DITCH 2

RAMP DITCH 3

RAMP DITCH 4

RAMP DITCH 5

CB 2-1

CB 2-2

CB 3-1

CB 3-2

CB 4-1

CP 102

DD 3-1

DD 3-2

DD 3-3

DD 4-1

DD 5-1

DD5-1

TDS 7

MS 3-1
PROPOSED MATERIALS STOCKPILE AREA

TDS 8
PROPOSED TOPDRESSING STOCKPILE AREA

MS 4-1
PROPOSED MATERIALS STOCKPILE AREA

MATCHLINE EXHIBIT 26.A-10

MATCHLINE EXHIBIT 26.A-11

WS 2

WS 2-1

WS 3

WS 4

WS 5-1

WS5

MINE LEASE BOUNDARY

200 0 200
SCALE IN FEET

NOT FOR CONSTRUCTION

NOTES

ALL ROADS THAT INTERSECT THE DIVERSION SHALL BE BARRICADED TO PREVENT ACCIDENTAL USE.

MAP SHOWS 2-FOOT CONTOUR INTERVAL.

FOR PIPE, CULVERT, DITCH AND SPILLWAY IN FORMATION SEE EXHIBIT 26.A-12

SURVEY INFORMATION

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Engineer's Certification

REV. NO.	DATE	DRAFT. BY	REVISION DESCRIPTION	PREP. BY	C.O.	P.E.	DATE CLOSED
0	4-22-09	MK	PAP SUBMITTAL	MK	AO	PJK	4-22-09

APPROVALS

EXHIBIT 26.A-11

NORWEST Applied Earthworks

BHP NAVAJO COAL COMPANY

bhpbilliton

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NAVAJO MINE EXTENSION PROJECT

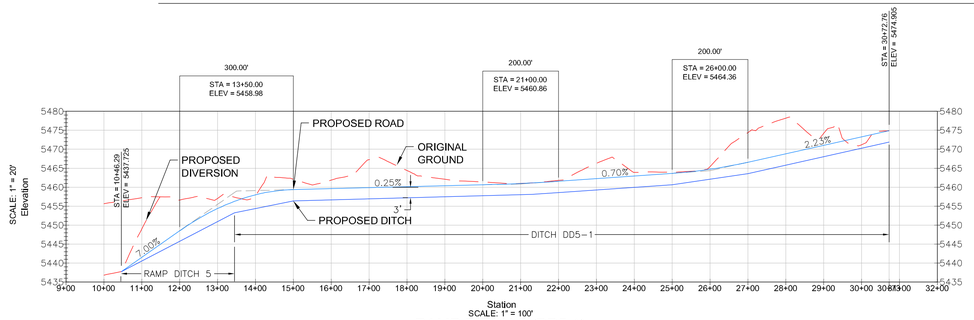
PINABETE DIVERSION CHANNEL
STORMWATER MANAGEMENT PLAN
EAST EROSION & SEDIMENT CONTROLS

PREPARED BY	MSK	DRAWN BY	JS	SCALE:	1" = 200'
APPROVED BY		DATE	Apr 21, 2009		

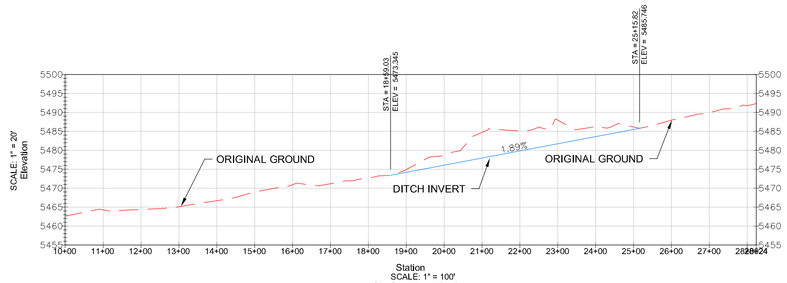
Apr 21, 2009 - 11:20am\n:\Navajo Mine Extension\PAP Exhibits\Plates\26.A-11 Erosion & Sediment.dwg

DRAINAGE DITCH DESIGN

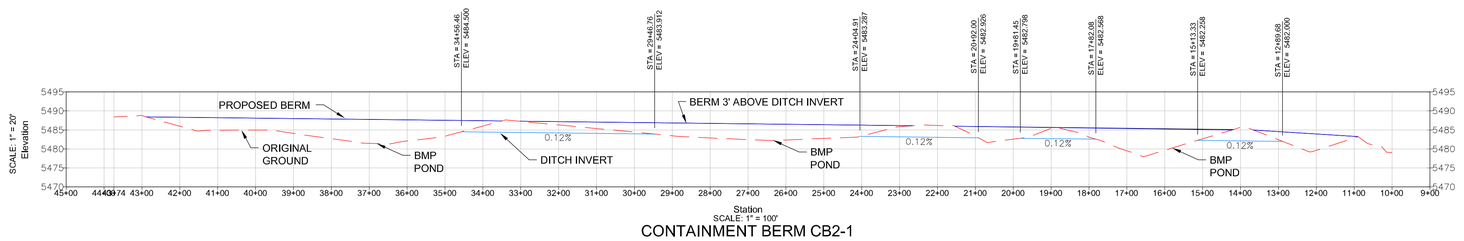
PROFILES



RAMP DITCH 5 (DD5-1)



DITCH DD3-1



CONTAINMENT BERM CB2-1

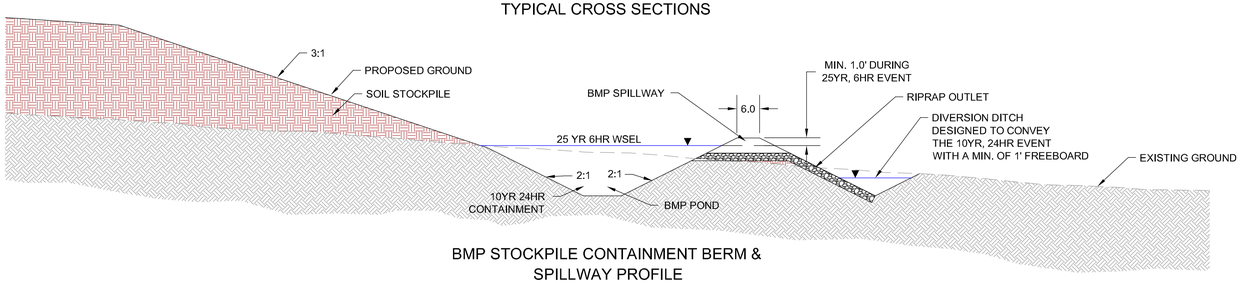
CONTAINMENT BERM & SEDIMENT CONTROL STRUCTURE TABLE

10YR-24HR CONTAINMENT BERM DESIGN						25YR-6HR OVERFLOW/SPILLWAY DESIGN				
DESIGNATION	AREA (AC)	DEPTH (FT)	DESIGN VOLUME (AC-FT)	**REQUIRED VOLUME (AC-FT)	EXCESS VOLUME (AC-FT)	PEAK FLOW (CFS)	TYPE	DIMENSIONS	PEAK STAGE (FT)	FREEBOARD (FT)
*Pond 1-1	0.978	10.0	5.810	3.114	2.696	100-Year Containment				
CB1-1	0.166	3.5	0.461	0.444	0.017	7.5	OPEN SPILLWAY	20-FT BOTTOM 2:1 SIDES	0.5	1.0
CB1-2	0.180	2.5	0.412	0.223	0.189	2.4	OPEN SPILLWAY	20-FT BOTTOM 2:1 SIDES	0.3	1.2
CB2-1	1.300	6.0	4.077	3.489	0.588	11.6	OPEN SPILLWAY	25-FT BOTTOM 2:1 SIDES	0.6	1.4
CB2-2	0.384	3.0	0.910	0.266	0.644	3.0	OPEN SPILLWAY	15-FT BOTTOM 2:1 SIDES	0.1	2.9
CB2-3	0.400	4.0	0.883	0.486	0.397	1.3	OPEN SPILLWAY	15-FT BOTTOM 2:1 SIDES	0.2	1.8
CB3-1	0.499	4.6	1.943	1.192	0.751	6.7	OPEN SPILLWAY	15-FT BOTTOM 2:1 SIDES	0.3	1.1
CB3-2	0.274	2.0	0.524	0.343	0.181	2.9	OPEN SPILLWAY	20-FT BOTTOM 2:1 SIDES	0.1	1.9
CB4-1	0.488	4.6	1.533	1.386	0.147	9.2	OPEN SPILLWAY	20-FT BOTTOM 2:1 SIDES	0.4	1.0

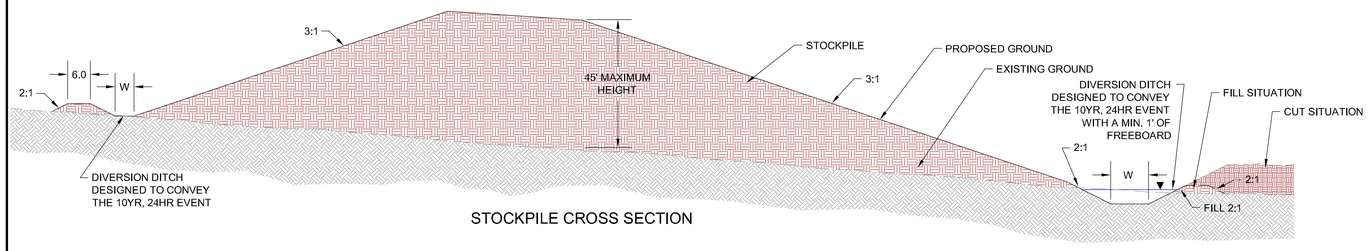
Notes: * Pond 1-1 is partially excavated. Containment and overflow has been designed based on flow from a 100 yr-6 hr storm into a dry pond; **Required Volume includes additional 50% of design storm volume for sediment deposition;

TOPDRESSING & MATERIAL STOCKPILES

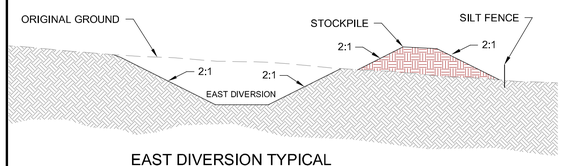
TYPICAL CROSS SECTIONS



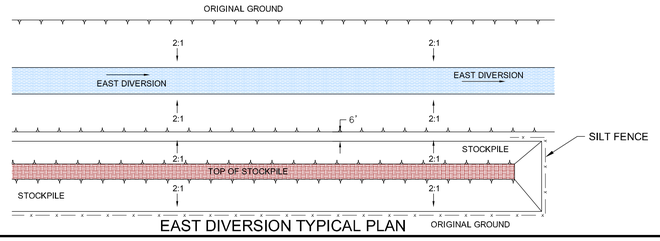
BMP STOCKPILE CONTAINMENT BERM & SPILLWAY PROFILE



STOCKPILE CROSS SECTION



EAST DIVERSION TYPICAL CROSS SECTION



EAST DIVERSION TYPICAL PLAN

CULVERT DESIGN TABLE (25YR-6HR)

DESIGNATION	FLOW (CFS)	LENGTH (FT)	SLOPE (%)	MATERIAL	SIZE (IN)	VELOCITY (FPS)	HEAD-WATER TO DEPTH RATIO
CP101	2.9	80	1.0	CMP	18	3.2	0.7
CP102	9.2	80	1.5	CMP	21	4.9	1.1

DITCH DESIGN TABLE (10YR-24HR)

DESIGNATION	FLOW (CFS)	SHAPE	SLOPE (%)	BOTTOM WIDTH (FT)	SIDE SLOPE RATIO (H:1V)	CHANNEL MATERIAL	RIPRAP SIZE D50 (IN)	FLOW DEPTH (FT)	DITCH DEPTH (FT)	VELOCITY (FPS)
DD1-1	7.2	TRIANGULAR	1.9	0.0	3	NATURAL	NA	0.9	1.9	3.2
DD1-2	30.9	TRAPEZOIDAL	1.3	12.0	2	NATURAL	NA	0.7	1.7	3.4
DD2-1	17.3	TRAPEZOIDAL	1.9	12.0	2	NATURAL	NA	0.4	1.4	3.5
DD3-1	30.8	TRAPEZOIDAL	1.9	12.0	2	NATURAL	NA	0.6	1.6	4.3
DD3-2	37.6	TRAPEZOIDAL	1.5	12.0	2	NATURAL	NA	0.7	1.7	4.3
DD3-3	4.7	TRIANGULAR	2.0	NA	3	NATURAL	NA	0.7	1.7	3.3
DD4-1	8.7	TRIANGULAR	0.5	NA	3	NATURAL	NA	1.1	2.1	2.3
DD5-1	65.8	TRAPEZOIDAL	0.3	12.0	2	NATURAL	NA	1.5	2.5	2.9
RAMP DITCH 1	36.8	TRAPEZOIDAL	7.0	12.0	2	RIPRAP	6	0.3	1.3	NA
RAMP DITCH 2	20.7	TRAPEZOIDAL	7.0	6.0	2	RIPRAP	6	0.3	1.3	NA
RAMP DITCH 3	39.0	TRAPEZOIDAL	7.0	12.0	2	RIPRAP	6	0.4	1.4	NA
RAMP DITCH 4	8.7	TRAPEZOIDAL	7.0	6.0	2	RIPRAP	3	0.2	1.2	NA
RAMP DITCH 5	65.8	TRAPEZOIDAL	7.0	12.0	2	RIPRAP	6	0.7	1.7	6.6

NOTES

INFORMATION IN TABLES COMPILED FROM SEDCAD MODELS FOR THE WATERSHEDS SHOWN ON EXHIBITS 26.A-9, 10, AND 11.

I PAUL J. KOS STAMPED AND SIGNED THIS DRAWING ON 04/22/2009

ORIGINAL CERTIFIED SIGNED EXHIBITS ARE MAINTAINED AT MINE SITE AND AT THE OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT.

Engineer's Certification

200 0 200
SCALE IN FEET

NOT FOR CONSTRUCTION

REV. No.	DATE	DRAFT. BY	REVISION DESCRIPTION	PREP. BY	E-G	P.E.	DATE CENTERED
0	4-22-09	MK	PAP SUBMITTAL	MK	AO	PJK	4-22-09

APPROVALS

EXHIBIT 26.A-12

NORWEST Applied Hydrology

BHP NAVAJO COAL COMPANY

bhpbilliton

P.O. BOX 1717
FRUITLAND, NEW MEXICO 87416
PHONE(505)598-4200
Fax(505)598-4322

NAVAJO MINE EXTENSION PROJECT

PINABETE DIVERSION CHANNEL
STORMWATER MANAGEMENT PLAN
DITCH PROFILES

PREPARED BY	MSK	DRAWN BY	JS	SCALE: 1" = 200'
APPROVED BY		DATE	Apr 21, 2009	

Apr 21, 2009 - 11:32am M:\Hydro Mine Extension\P Drawings\Permit\26A-12 Ditch & Diversion.dwg

ATTACHMENT 26.A-A NOAA ATLAS 14

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Mexico 36.456632 N 108.401838 W 5780 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Wed Sep 10 2008

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Docs | U.S. Map

Precipitation Frequency Estimates (inches)

AEP* (1-in-Y)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.18	0.27	0.33	0.45	0.55	0.61	0.66	0.77	0.90	1.02	1.16	1.34	1.51	1.71	2.17	2.60	3.10	3.56
5	0.26	0.39	0.48	0.65	0.81	0.88	0.94	1.06	1.22	1.41	1.59	1.82	2.05	2.32	2.94	3.51	4.18	4.77
10	0.32	0.48	0.60	0.80	1.00	1.08	1.14	1.26	1.43	1.68	1.89	2.16	2.42	2.72	3.45	4.09	4.86	5.53
25	0.40	0.61	0.75	1.01	1.26	1.36	1.42	1.55	1.72	2.05	2.28	2.58	2.88	3.22	4.10	4.83	5.70	6.45
50	0.47	0.71	0.88	1.19	1.47	1.59	1.65	1.79	1.94	2.33	2.58	2.91	3.23	3.60	4.59	5.36	6.31	7.11
100	0.54	0.82	1.01	1.37	1.69	1.85	1.90	2.03	2.16	2.62	2.90	3.24	3.58	3.97	5.07	5.89	6.91	7.74
200	0.61	0.94	1.16	1.56	1.93	2.12	2.17	2.30	2.41	2.93	3.22	3.57	3.94	4.34	5.55	6.41	7.49	8.36
500	0.73	1.10	1.37	1.84	2.28	2.52	2.57	2.69	2.74	3.36	3.66	4.03	4.42	4.84	6.20	7.09	8.25	9.15
1000	0.82	1.24	1.54	2.07	2.57	2.85	2.90	3.02	3.04	3.71	4.01	4.38	4.79	5.21	6.69	7.61	8.82	9.74

* These precipitation frequency estimates are based on an annual maxima series. AEP is the Annual Exceedance Probability.
Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

AEP** (1-in-Y)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.21	0.31	0.39	0.52	0.65	0.71	0.76	0.87	1.01	1.13	1.28	1.48	1.66	1.88	2.39	2.87	3.41	3.91
5	0.30	0.46	0.57	0.77	0.95	1.02	1.08	1.19	1.36	1.55	1.75	2.01	2.26	2.54	3.23	3.88	4.58	5.24
10	0.37	0.57	0.70	0.94	1.17	1.25	1.30	1.43	1.59	1.85	2.07	2.37	2.65	2.98	3.79	4.53	5.33	6.07
25	0.47	0.71	0.88	1.19	1.47	1.58	1.62	1.75	1.91	2.25	2.50	2.84	3.16	3.53	4.49	5.33	6.26	7.08
50	0.55	0.83	1.03	1.39	1.72	1.85	1.88	2.02	2.16	2.56	2.83	3.19	3.54	3.94	5.03	5.92	6.93	7.80
100	0.63	0.96	1.19	1.60	1.98	2.14	2.17	2.29	2.41	2.89	3.18	3.56	3.93	4.35	5.56	6.51	7.59	8.49
200	0.72	1.10	1.36	1.84	2.27	2.46	2.49	2.60	2.69	3.24	3.53	3.93	4.33	4.76	6.10	7.10	8.25	9.17
500	0.85	1.30	1.61	2.17	2.69	2.94	2.96	3.07	3.08	3.72	4.02	4.45	4.86	5.32	6.82	7.86	9.10	10.06
1000	0.97	1.47	1.82	2.45	3.04	3.34	3.36	3.45	3.49	4.10	4.42	4.85	5.28	5.75	7.38	8.44	9.75	10.73

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on an annual maxima series. AEP is the Annual Exceedance Probability.

Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

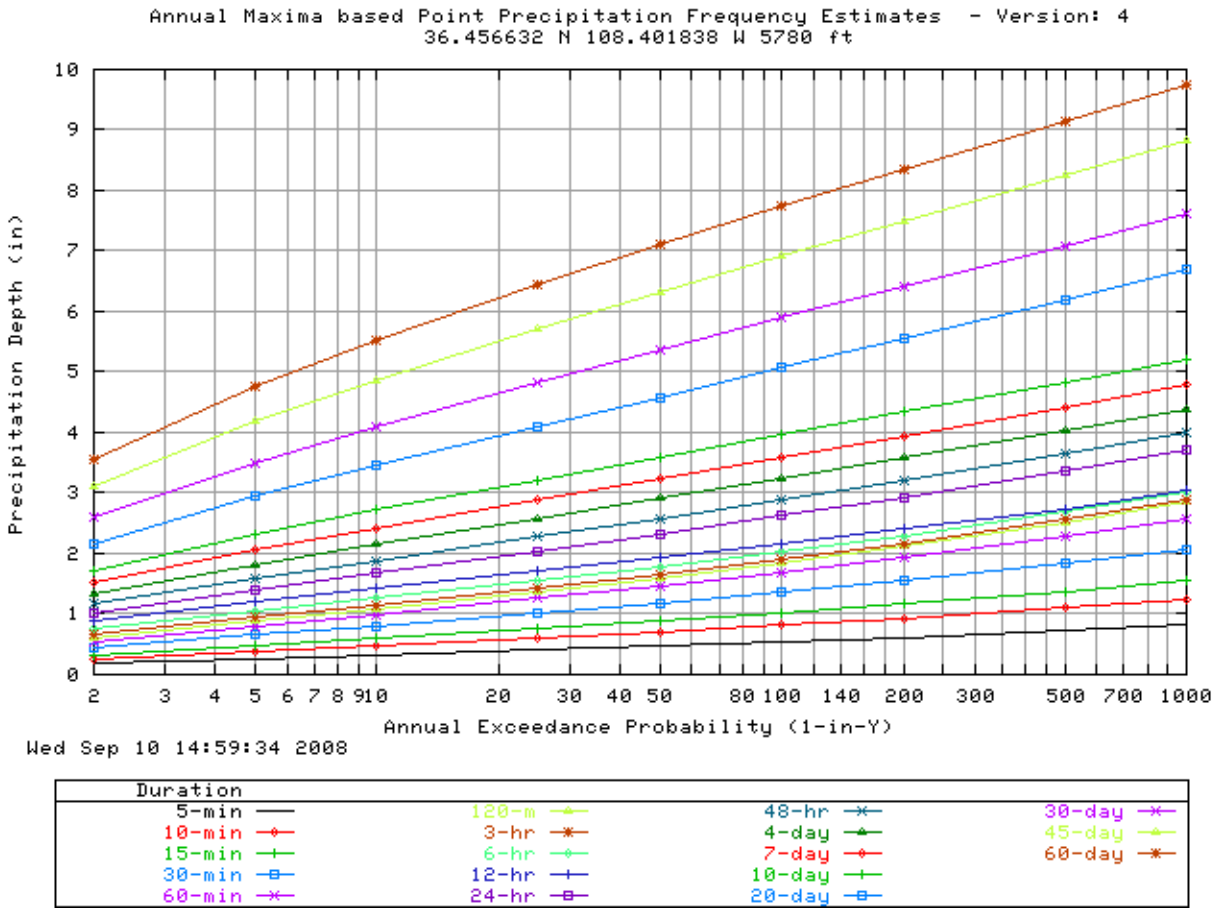
AEP** (1-in-Y)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.15	0.23	0.28	0.38	0.47	0.53	0.58	0.69	0.81	0.92	1.05	1.21	1.37	1.56	1.98	2.36	2.83	3.24
5	0.22	0.34	0.42	0.56	0.69	0.76	0.82	0.95	1.10	1.27	1.43	1.65	1.86	2.10	2.67	3.19	3.80	4.33
10	0.27	0.41	0.51	0.69	0.85	0.93	0.99	1.13	1.29	1.51	1.70	1.95	2.18	2.47	3.13	3.71	4.42	5.02
25	0.34	0.51	0.64	0.86	1.06	1.16	1.23	1.37	1.54	1.83	2.04	2.32	2.59	2.91	3.71	4.37	5.17	5.84

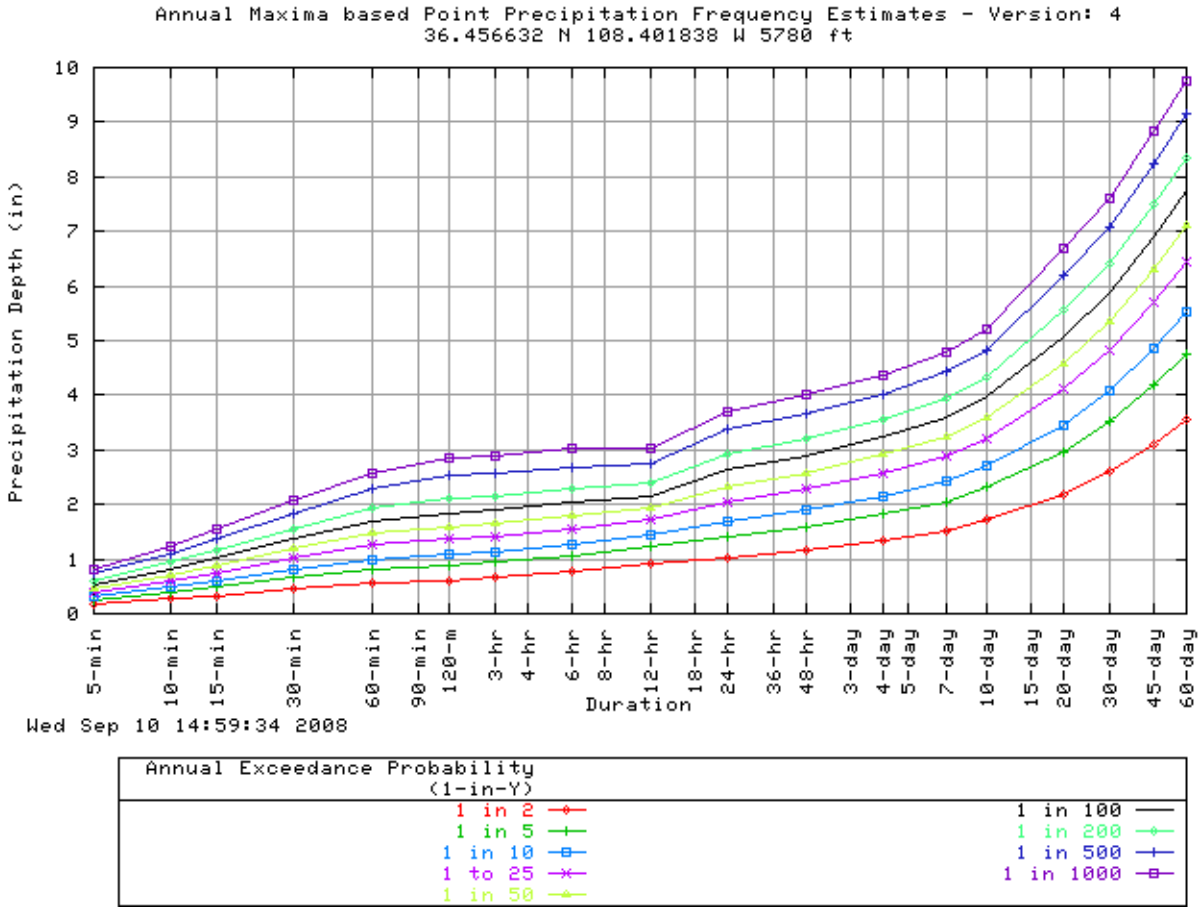
50	0.39	0.60	0.74	0.99	1.23	1.35	1.41	1.57	1.72	2.08	2.30	2.60	2.90	3.24	4.13	4.84	5.70	6.42
100	0.45	0.68	0.84	1.13	1.40	1.54	1.60	1.76	1.91	2.33	2.56	2.89	3.20	3.57	4.55	5.29	6.22	6.97
200	0.50	0.77	0.95	1.28	1.59	1.74	1.81	1.96	2.10	2.59	2.84	3.17	3.50	3.89	4.96	5.74	6.71	7.49
500	0.58	0.89	1.10	1.48	1.83	2.03	2.10	2.24	2.35	2.94	3.20	3.54	3.89	4.30	5.49	6.30	7.34	8.15
1000	0.65	0.98	1.22	1.64	2.03	2.26	2.33	2.47	2.57	3.21	3.48	3.83	4.19	4.60	5.90	6.72	7.80	8.63

* The lower bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are less than.
** These precipitation frequency estimates are based on an annual maxima series. AEP is the Annual Exceedance Probability.

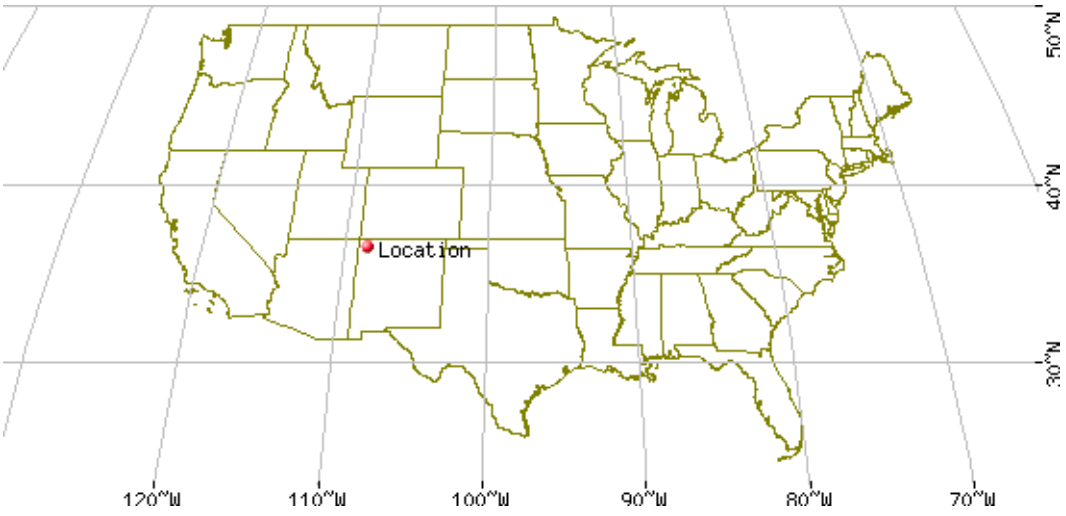
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

Text version of tables



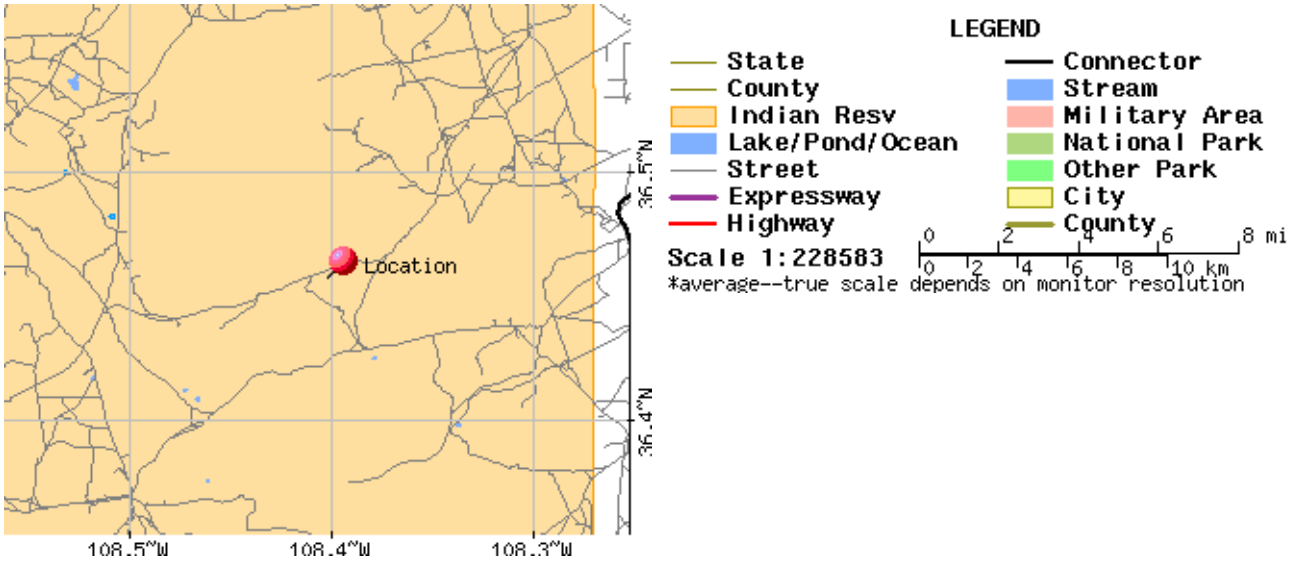


Maps -



These maps were produced using a direct map request from the
U.S. Census Bureau Mapping and Cartographic Resources
Tiger Map Server.

Please read disclaimer for more information.



Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available
from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information
about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study,
please refer to our documentation.

Using the **National Climatic Data Center's (NCDC)** station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (36.456632/-108.401838). Digital ASCII data can be obtained directly from **NCDC**.

Find Natural Resources Conservation Service (NRCS) SNOTEL (SNOwpack TELemetry) stations by visiting the
Western Regional Climate Center's state-specific SNOTEL station maps.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910

(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

ATTACHMENT 26.A-B HEC-RAS REPORTS

Attachment 26.A-B.1

```
                    HEC-RAS Version 4.0.0 March 2008
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


           X     X  XXXXXX    XXXX        XXXX       XX      XXXX
           X     X  X        X    X       X   X     X  X    X
           X     X  X        X            X   X    X    X   X
           XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
           X     X  X        X            X  X     X    X        X
           X     X  X        X    X       X   X    X    X        X
           X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


********************************************************************************

PROJECT DATA
Project Title: Pinabete Diversion-XS Evaluation
Project File : PinabeteDiversion-XSEvaluation.prj
Run Date and Time: 4/13/2009 2:16:34 PM

Project in English units

********************************************************************************

PLAN DATA

Plan Title: Plan 63
Plan File : s:\4010-00060 BHPB-Navajo Mine Extension Project\Pinabete Diversion\Modeling\Design
Alternatives\HEC-RAS\PinabeteDiversion-XSEvaluation.p63

          Geometry Title: Stage Discharge Final
          Geometry File : s:\4010-00060 BHPB-Navajo Mine Extension Project\Pinabete
Diversion\Modeling\Design Alternatives\HEC-RAS\PinabeteDiversion-XSEvaluation.g15

          Flow Title  : Pinabete Diversion-Steady Flow
          Flow File   : s:\4010-00060 BHPB-Navajo Mine Extension Project\Pinabete
Diversion\Modeling\Design Alternatives\HEC-RAS\PinabeteDiversion-XSEvaluation.f04

Plan Summary Information:
Number of:  Cross Sections =   65    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Mixed Flow


********************************************************************************
```

FLOW DATA

Flow Title: Pinabete Diversion-Steady Flow
Flow File : s:\4010-00060 BHPB-Navajo Mine Extension Project\Pinabete Diversion\Modeling\Design Alternatives\HEC-RAS\PinabeteDiversion-XSEvaluation.f04

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2	PF 3	PF 4	PF 5	PF 6	PF 7	PF 8
Pinabete	Diversion	2.500	.01	10	20	30	40	50	60	70

River	Reach	RS	PF 9	PF 10	PF 11	PF 12	PF 13	2 Yr	PF 15	PF 16
Pinabete	Diversion	2.500	80	90	100	200	300	403.97	500	600

River	Reach	RS	PF 17	P5 Yr	PF 19	PF 20	PF 21	10 Yr	PF 23	PF 24
Pinabete	Diversion	2.500	700	768.99	800	900	1000	1116.63	1250	1500

River	Reach	RS	25 Yr	PF 26	50 Yr	PF 28	PF 29	100 Yr	PF 31	PF 32
Pinabete	Diversion	2.500	1702.18	2000	2235.26	2800	2750	2856.65	3000	3250

River	Reach	RS	PF 33	PF 34	PF 35	500 Yr	PF 37	PF 38	PF 39	PF 40
Pinabete	Diversion	2.500	3500	3750	4000	4652.39	5000	5500	6000	7000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Pinabete	Diversion	All	Critical	Normal S = 0.0026

GEOMETRY DATA

Geometry Title: Stage Discharge Final
Geometry File : s:\4010-00060 BHPB-Navajo Mine Extension Project\Pinabete Diversion\Modeling\Design Alternatives\HEC-RAS\PinabeteDiversion-XSEvaluation.g15

CROSS SECTION

RIVER: Pinabete
REACH: Diversion RS: 1.000

INPUT
Description:
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	5492.25	110	5464.75	139.5	5450	147.5	5450	147.5	5447
177.5	5447	177.5	5444	189.5	5444	189.5	5441	192.5	5441
192.5	5438	195.5	5438	195.5	5435	197	5435	197	5432
198.5	5432	198.5	5430	201.5	5430	201.5	5432	203	5432
203	5435	204.5	5435	204.5	5438	207.5	5438	207.5	5441
210.5	5441	210.5	5444	222.5	5444	222.5	5447	252.5	5447
252.5	5450	260.5	5450	290	5464.75	400	5492.25		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	110	.05	290	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
110	290	1	1	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	5430.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.050	
W.S. Elev (ft)	5430.02	Reach Len. (ft)			
Crit W.S. (ft)	5430.02	Flow Area (sq ft)		0.07	
E.G. Slope (ft/ft)	*0.003486	Area (sq ft)		0.07	
Q Total (cfs)	0.01	Flow (cfs)		0.01	
Top Width (ft)	3.00	Top Width (ft)		3.00	
Vel Total (ft/s)	0.14	Avg. Vel. (ft/s)		0.14	
Max Chl Dpth (ft)	0.02	Hydr. Depth (ft)		0.02	
Conv. Total (cfs)	0.2	Conv. (cfs)		0.2	
Length Wtd. (ft)		Wetted Per. (ft)		3.05	
Min Ch El (ft)	5430.00	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Slope-Area method could not converge on a starting water surface elevation within the specified number of trials. The program used critical depth as the starting water surface.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	5432.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.050	
W.S. Elev (ft)	5432.33	Reach Len. (ft)			
Crit W.S. (ft)	5430.70	Flow Area (sq ft)		7.99	
E.G. Slope (ft/ft)	*0.002604	Area (sq ft)		7.99	
Q Total (cfs)	10.00	Flow (cfs)		10.00	
Top Width (ft)	6.00	Top Width (ft)		6.00	
Vel Total (ft/s)	1.25	Avg. Vel. (ft/s)		1.25	
Max Chl Dpth (ft)	2.33	Hydr. Depth (ft)		1.33	
Conv. Total (cfs)	196.0	Conv. (cfs)		196.0	
Length Wtd. (ft)		Wetted Per. (ft)		10.66	
Min Ch El (ft)	5430.00	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 5433.17	* Element	* Left OB *	Channel *	Right OB *
* Vel Head (ft)	* 0.04	* Wt. n-Val.	*	0.050 *	*
* W.S. Elev (ft)	* 5433.14	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5431.11	* Flow Area (sq ft)	*	12.81 *	*
* E.G. Slope (ft/ft)	*0.002603	* Area (sq ft)	*	12.81 *	*
* Q Total (cfs)	* 20.00	* Flow (cfs)	*	20.00 *	*
* Top Width (ft)	* 6.00	* Top Width (ft)	*	6.00 *	*
* Vel Total (ft/s)	* 1.56	* Avg. Vel. (ft/s)	*	1.56 *	*
* Max Chl Dpth (ft)	* 3.14	* Hydr. Depth (ft)	*	2.14 *	*
* Conv. Total (cfs)	* 392.0	* Conv. (cfs)	*	392.0 *	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	12.27 *	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	0.17 *	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	0.26 *	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	* 5433.90	* Element	* Left OB *	Channel *	Right OB *
* Vel Head (ft)	* 0.05	* Wt. n-Val.	*	0.050 *	*
* W.S. Elev (ft)	* 5433.85	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5431.46	* Flow Area (sq ft)	*	17.08 *	*
* E.G. Slope (ft/ft)	*0.002602	* Area (sq ft)	*	17.08 *	*
* Q Total (cfs)	* 30.00	* Flow (cfs)	*	30.00 *	*
* Top Width (ft)	* 6.00	* Top Width (ft)	*	6.00 *	*
* Vel Total (ft/s)	* 1.76	* Avg. Vel. (ft/s)	*	1.76 *	*
* Max Chl Dpth (ft)	* 3.85	* Hydr. Depth (ft)	*	2.85 *	*
* Conv. Total (cfs)	* 588.2	* Conv. (cfs)	*	588.2 *	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	13.69 *	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	0.20 *	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	0.36 *	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 5434.57	* Element	* Left OB *	Channel *	Right OB *
* Vel Head (ft)	* 0.06	* Wt. n-Val.	*	0.050 *	*
* W.S. Elev (ft)	* 5434.51	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5431.76	* Flow Area (sq ft)	*	21.07 *	*
* E.G. Slope (ft/ft)	*0.002599	* Area (sq ft)	*	21.07 *	*
* Q Total (cfs)	* 40.00	* Flow (cfs)	*	40.00 *	*
* Top Width (ft)	* 6.00	* Top Width (ft)	*	6.00 *	*
* Vel Total (ft/s)	* 1.90	* Avg. Vel. (ft/s)	*	1.90 *	*
* Max Chl Dpth (ft)	* 4.51	* Hydr. Depth (ft)	*	3.51 *	*
* Conv. Total (cfs)	* 784.6	* Conv. (cfs)	*	784.6 *	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	15.02 *	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	0.23 *	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	0.43 *	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 5435.37	* Element	* Left OB *	Channel *	Right OB *
* Vel Head (ft)	* 0.05	* Wt. n-Val.	*	0.050 *	*
* W.S. Elev (ft)	* 5435.31	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5432.28	* Flow Area (sq ft)	*	26.80 *	*
* E.G. Slope (ft/ft)	*0.002601	* Area (sq ft)	*	26.80 *	*
* Q Total (cfs)	* 50.00	* Flow (cfs)	*	50.00 *	*
* Top Width (ft)	* 9.00	* Top Width (ft)	*	9.00 *	*
* Vel Total (ft/s)	* 1.87	* Avg. Vel. (ft/s)	*	1.87 *	*
* Max Chl Dpth (ft)	* 5.31	* Hydr. Depth (ft)	*	2.98 *	*
* Conv. Total (cfs)	* 980.4	* Conv. (cfs)	*	980.4 *	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	19.62 *	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	0.22 *	*

* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.41	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #PF 7

* E.G. Elev (ft)	* 5435.77	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.06	* Wt. n-Val.	*	* 0.050	*
* W.S. Elev (ft)	* 5435.71	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5432.44	* Flow Area (sq ft)	*	* 30.38	*
* E.G. Slope (ft/ft)	*0.002601	* Area (sq ft)	*	* 30.38	*
* Q Total (cfs)	* 60.00	* Flow (cfs)	*	* 60.00	*
* Top Width (ft)	* 9.00	* Top Width (ft)	*	* 9.00	*
* Vel Total (ft/s)	* 1.98	* Avg. Vel. (ft/s)	*	* 1.98	*
* Max Chl Dpth (ft)	* 5.71	* Hydr. Depth (ft)	*	* 3.38	*
* Conv. Total (cfs)	* 1176.5	* Conv. (cfs)	*	* 1176.5	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 20.42	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.24	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.48	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #PF 8

* E.G. Elev (ft)	* 5436.16	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.07	* Wt. n-Val.	*	* 0.050	*
* W.S. Elev (ft)	* 5436.09	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5432.62	* Flow Area (sq ft)	*	* 33.80	*
* E.G. Slope (ft/ft)	*0.002603	* Area (sq ft)	*	* 33.80	*
* Q Total (cfs)	* 70.00	* Flow (cfs)	*	* 70.00	*
* Top Width (ft)	* 9.00	* Top Width (ft)	*	* 9.00	*
* Vel Total (ft/s)	* 2.07	* Avg. Vel. (ft/s)	*	* 2.07	*
* Max Chl Dpth (ft)	* 6.09	* Hydr. Depth (ft)	*	* 3.76	*
* Conv. Total (cfs)	* 1372.1	* Conv. (cfs)	*	* 1372.1	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 21.18	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.26	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.54	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #PF 9

* E.G. Elev (ft)	* 5436.53	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.07	* Wt. n-Val.	*	* 0.050	*
* W.S. Elev (ft)	* 5436.46	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5432.75	* Flow Area (sq ft)	*	* 37.14	*
* E.G. Slope (ft/ft)	*0.002600	* Area (sq ft)	*	* 37.14	*
* Q Total (cfs)	* 80.00	* Flow (cfs)	*	* 80.00	*
* Top Width (ft)	* 9.00	* Top Width (ft)	*	* 9.00	*
* Vel Total (ft/s)	* 2.15	* Avg. Vel. (ft/s)	*	* 2.15	*
* Max Chl Dpth (ft)	* 6.46	* Hydr. Depth (ft)	*	* 4.13	*
* Conv. Total (cfs)	* 1568.9	* Conv. (cfs)	*	* 1568.9	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 21.92	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.28	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.59	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #PF 10

* E.G. Elev (ft)	* 5436.90	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.08	* Wt. n-Val.	*	* 0.050	*
* W.S. Elev (ft)	* 5436.82	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5432.91	* Flow Area (sq ft)	*	* 40.37	*
* E.G. Slope (ft/ft)	*0.002603	* Area (sq ft)	*	* 40.37	*

* Q Total (cfs)	* 90.00	* Flow (cfs)	*	* 90.00	*	*	*	*
* Top Width (ft)	* 9.00	* Top Width (ft)	*	* 9.00	*	*	*	*
* Vel Total (ft/s)	* 2.23	* Avg. Vel. (ft/s)	*	* 2.23	*	*	*	*
* Max Chl Dpth (ft)	* 6.82	* Hydr. Depth (ft)	*	* 4.49	*	*	*	*
* Conv. Total (cfs)	* 1764.0	* Conv. (cfs)	*	* 1764.0	*	*	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 22.64	*	*	*	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.29	*	*	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.65	*	*	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*	*	*

CROSS SECTION OUTPUT Profile #PF 11

* E.G. Elev (ft)	* 5437.25	* Element	*	Left OB *	Channel	*	Right OB	*
* Vel Head (ft)	* 0.08	* Wt. n-Val.	*	* 0.050	*	*	*	*
* W.S. Elev (ft)	* 5437.17	* Reach Len. (ft)	*	*	*	*	*	*
* Crit W.S. (ft)	* 5433.05	* Flow Area (sq ft)	*	* 43.53	*	*	*	*
* E.G. Slope (ft/ft)	*0.002602	* Area (sq ft)	*	* 43.53	*	*	*	*
* Q Total (cfs)	* 100.00	* Flow (cfs)	*	* 100.00	*	*	*	*
* Top Width (ft)	* 9.00	* Top Width (ft)	*	* 9.00	*	*	*	*
* Vel Total (ft/s)	* 2.30	* Avg. Vel. (ft/s)	*	* 2.30	*	*	*	*
* Max Chl Dpth (ft)	* 7.17	* Hydr. Depth (ft)	*	* 4.84	*	*	*	*
* Conv. Total (cfs)	* 1960.3	* Conv. (cfs)	*	* 1960.3	*	*	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 23.34	*	*	*	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.30	*	*	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.70	*	*	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*	*	*

CROSS SECTION OUTPUT Profile #PF 12

* E.G. Elev (ft)	* 5439.85	* Element	*	Left OB *	Channel	*	Right OB	*
* Vel Head (ft)	* 0.10	* Wt. n-Val.	*	* 0.050	*	*	*	*
* W.S. Elev (ft)	* 5439.74	* Reach Len. (ft)	*	*	*	*	*	*
* Crit W.S. (ft)	* 5434.26	* Flow Area (sq ft)	*	* 77.14	*	*	*	*
* E.G. Slope (ft/ft)	*0.002602	* Area (sq ft)	*	* 77.14	*	*	*	*
* Q Total (cfs)	* 200.00	* Flow (cfs)	*	* 200.00	*	*	*	*
* Top Width (ft)	* 15.00	* Top Width (ft)	*	* 15.00	*	*	*	*
* Vel Total (ft/s)	* 2.59	* Avg. Vel. (ft/s)	*	* 2.59	*	*	*	*
* Max Chl Dpth (ft)	* 9.74	* Hydr. Depth (ft)	*	* 5.14	*	*	*	*
* Conv. Total (cfs)	* 3921.1	* Conv. (cfs)	*	* 3921.1	*	*	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 34.49	*	*	*	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.36	*	*	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.94	*	*	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*	*	*

CROSS SECTION OUTPUT Profile #PF 13

* E.G. Elev (ft)	* 5441.72	* Element	*	Left OB *	Channel	*	Right OB	*
* Vel Head (ft)	* 0.12	* Wt. n-Val.	*	* 0.050	*	*	*	*
* W.S. Elev (ft)	* 5441.60	* Reach Len. (ft)	*	*	*	*	*	*
* Crit W.S. (ft)	* 5435.59	* Flow Area (sq ft)	*	* 108.67	*	*	*	*
* E.G. Slope (ft/ft)	*0.002601	* Area (sq ft)	*	* 108.67	*	*	*	*
* Q Total (cfs)	* 300.00	* Flow (cfs)	*	* 300.00	*	*	*	*
* Top Width (ft)	* 21.00	* Top Width (ft)	*	* 21.00	*	*	*	*
* Vel Total (ft/s)	* 2.76	* Avg. Vel. (ft/s)	*	* 2.76	*	*	*	*
* Max Chl Dpth (ft)	* 11.60	* Hydr. Depth (ft)	*	* 5.17	*	*	*	*
* Conv. Total (cfs)	* 5882.6	* Conv. (cfs)	*	* 5882.6	*	*	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 44.21	*	*	*	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.40	*	*	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 1.10	*	*	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*	*	*

CROSS SECTION OUTPUT Profile #2 Yr

E.G. Elev (ft)	5442.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.050	
W.S. Elev (ft)	5442.74	Reach Len. (ft)			
Crit W.S. (ft)	5436.30	Flow Area (sq ft)		132.56	
E.G. Slope (ft/ft)	*0.002600	Area (sq ft)		132.56	
Q Total (cfs)	403.97	Flow (cfs)		403.97	
Top Width (ft)	21.00	Top Width (ft)		21.00	
Vel Total (ft/s)	3.05	Avg. Vel. (ft/s)		3.05	
Max Chl Dpth (ft)	12.74	Hydr. Depth (ft)		6.31	
Conv. Total (cfs)	7922.0	Conv. (cfs)		7922.0	
Length Wtd. (ft)		Wetted Per. (ft)		46.48	
Min Ch El (ft)	5430.00	Shear (lb/sq ft)		0.46	
Alpha	1.00	Stream Power (lb/ft s)		1.41	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 15

E.G. Elev (ft)	5443.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.050	
W.S. Elev (ft)	5443.72	Reach Len. (ft)			
Crit W.S. (ft)	5436.91	Flow Area (sq ft)		153.17	
E.G. Slope (ft/ft)	*0.002600	Area (sq ft)		153.17	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	21.00	Top Width (ft)		21.00	
Vel Total (ft/s)	3.26	Avg. Vel. (ft/s)		3.26	
Max Chl Dpth (ft)	13.72	Hydr. Depth (ft)		7.29	
Conv. Total (cfs)	9805.4	Conv. (cfs)		9805.4	
Length Wtd. (ft)		Wetted Per. (ft)		48.44	
Min Ch El (ft)	5430.00	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		1.68	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 16

E.G. Elev (ft)	5445.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.050	
W.S. Elev (ft)	5444.99	Reach Len. (ft)			
Crit W.S. (ft)	5437.46	Flow Area (sq ft)		203.41	
E.G. Slope (ft/ft)	*0.002604	Area (sq ft)		203.41	
Q Total (cfs)	600.00	Flow (cfs)		600.00	
Top Width (ft)	45.00	Top Width (ft)		45.00	
Vel Total (ft/s)	2.95	Avg. Vel. (ft/s)		2.95	
Max Chl Dpth (ft)	14.99	Hydr. Depth (ft)		4.52	
Conv. Total (cfs)	11758.8	Conv. (cfs)		11758.8	
Length Wtd. (ft)		Wetted Per. (ft)		74.97	
Min Ch El (ft)	5430.00	Shear (lb/sq ft)		0.44	
Alpha	1.00	Stream Power (lb/ft s)		1.30	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 17

E.G. Elev (ft)	5445.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.050	
W.S. Elev (ft)	5445.45	Reach Len. (ft)			
Crit W.S. (ft)	5438.65	Flow Area (sq ft)		224.19	
E.G. Slope (ft/ft)	*0.002604	Area (sq ft)		224.19	
Q Total (cfs)	700.00	Flow (cfs)		700.00	
Top Width (ft)	45.00	Top Width (ft)		45.00	
Vel Total (ft/s)	3.12	Avg. Vel. (ft/s)		3.12	
Max Chl Dpth (ft)	15.45	Hydr. Depth (ft)		4.98	
Conv. Total (cfs)	13716.5	Conv. (cfs)		13716.5	

* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	*	75.90	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	*	0.48	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	1.50	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*		*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*		*

CROSS SECTION OUTPUT Profile #P5 Yr

* E.G. Elev (ft)	* 5445.92	* Element	* Left OB	*	Channel	* Right OB *
* Vel Head (ft)	* 0.16	* Wt. n-Val.	*	*	0.050	*
* W.S. Elev (ft)	* 5445.76	* Reach Len. (ft)	*	*		*
* Crit W.S. (ft)	* 5438.89	* Flow Area (sq ft)	*	*	237.97	*
* E.G. Slope (ft/ft)	*0.002604	* Area (sq ft)	*	*	237.97	*
* Q Total (cfs)	* 768.99	* Flow (cfs)	*	*	768.99	*
* Top Width (ft)	* 45.00	* Top Width (ft)	*	*	45.00	*
* Vel Total (ft/s)	* 3.23	* Avg. Vel. (ft/s)	*	*	3.23	*
* Max Chl Dpth (ft)	* 15.75	* Hydr. Depth (ft)	*	*	5.29	*
* Conv. Total (cfs)	* 15069.0	* Conv. (cfs)	*	*	15069.0	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	*	76.51	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	*	0.51	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	1.63	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*		*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*		*

CROSS SECTION OUTPUT Profile #PF 19

* E.G. Elev (ft)	* 5446.06	* Element	* Left OB	*	Channel	* Right OB *
* Vel Head (ft)	* 0.17	* Wt. n-Val.	*	*	0.050	*
* W.S. Elev (ft)	* 5445.89	* Reach Len. (ft)	*	*		*
* Crit W.S. (ft)	* 5439.02	* Flow Area (sq ft)	*	*	244.06	*
* E.G. Slope (ft/ft)	*0.002603	* Area (sq ft)	*	*	244.06	*
* Q Total (cfs)	* 800.00	* Flow (cfs)	*	*	800.00	*
* Top Width (ft)	* 45.00	* Top Width (ft)	*	*	45.00	*
* Vel Total (ft/s)	* 3.28	* Avg. Vel. (ft/s)	*	*	3.28	*
* Max Chl Dpth (ft)	* 15.89	* Hydr. Depth (ft)	*	*	5.42	*
* Conv. Total (cfs)	* 15679.8	* Conv. (cfs)	*	*	15679.8	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	*	76.78	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	*	0.52	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	1.69	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*		*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*		*

CROSS SECTION OUTPUT Profile #PF 20

* E.G. Elev (ft)	* 5446.49	* Element	* Left OB	*	Channel	* Right OB *
* Vel Head (ft)	* 0.18	* Wt. n-Val.	*	*	0.050	*
* W.S. Elev (ft)	* 5446.31	* Reach Len. (ft)	*	*		*
* Crit W.S. (ft)	* 5439.40	* Flow Area (sq ft)	*	*	263.04	*
* E.G. Slope (ft/ft)	*0.002604	* Area (sq ft)	*	*	263.04	*
* Q Total (cfs)	* 900.00	* Flow (cfs)	*	*	900.00	*
* Top Width (ft)	* 45.00	* Top Width (ft)	*	*	45.00	*
* Vel Total (ft/s)	* 3.42	* Avg. Vel. (ft/s)	*	*	3.42	*
* Max Chl Dpth (ft)	* 16.31	* Hydr. Depth (ft)	*	*	5.85	*
* Conv. Total (cfs)	* 17636.0	* Conv. (cfs)	*	*	17636.0	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	*	77.62	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	*	0.55	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	1.89	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*		*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*		*

CROSS SECTION OUTPUT Profile #PF 21

* E.G. Elev (ft)	* 5446.92	* Element	* Left OB	*	Channel	* Right OB *
* Vel Head (ft)	* 0.20	* Wt. n-Val.	*	*	0.050	*
* W.S. Elev (ft)	* 5446.72	* Reach Len. (ft)	*	*		*

* Crit W.S. (ft)	* 5439.74	* Flow Area (sq ft)	*	* 281.39	*
* E.G. Slope (ft/ft)	*0.002604	* Area (sq ft)	*	* 281.39	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	*
* Top Width (ft)	* 45.00	* Top Width (ft)	*	* 45.00	*
* Vel Total (ft/s)	* 3.55	* Avg. Vel. (ft/s)	*	* 3.55	*
* Max Chl Dpth (ft)	* 16.72	* Hydr. Depth (ft)	*	* 6.25	*
* Conv. Total (cfs)	* 19596.4	* Conv. (cfs)	*	* 19596.4	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 78.44	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.58	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.07	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #10 Yr

* E.G. Elev (ft)	* 5447.95	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.13	* Wt. n-Val.	*	* 0.050	*
* W.S. Elev (ft)	* 5447.82	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5440.11	* Flow Area (sq ft)	*	* 379.72	*
* E.G. Slope (ft/ft)	*0.002604	* Area (sq ft)	*	* 379.72	*
* Q Total (cfs)	* 1116.63	* Flow (cfs)	*	* 1116.63	*
* Top Width (ft)	* 105.00	* Top Width (ft)	*	* 105.00	*
* Vel Total (ft/s)	* 2.94	* Avg. Vel. (ft/s)	*	* 2.94	*
* Max Chl Dpth (ft)	* 17.82	* Hydr. Depth (ft)	*	* 3.62	*
* Conv. Total (cfs)	* 21881.6	* Conv. (cfs)	*	* 21881.6	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 140.63	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.44	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 1.29	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #PF 23

* E.G. Elev (ft)	* 5448.22	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.15	* Wt. n-Val.	*	* 0.050	*
* W.S. Elev (ft)	* 5448.08	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5440.58	* Flow Area (sq ft)	*	* 407.05	*
* E.G. Slope (ft/ft)	*0.002601	* Area (sq ft)	*	* 407.05	*
* Q Total (cfs)	* 1250.00	* Flow (cfs)	*	* 1250.00	*
* Top Width (ft)	* 105.00	* Top Width (ft)	*	* 105.00	*
* Vel Total (ft/s)	* 3.07	* Avg. Vel. (ft/s)	*	* 3.07	*
* Max Chl Dpth (ft)	* 18.08	* Hydr. Depth (ft)	*	* 3.88	*
* Conv. Total (cfs)	* 24508.1	* Conv. (cfs)	*	* 24508.1	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 141.15	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.47	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 1.44	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #PF 24

* E.G. Elev (ft)	* 5448.70	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.17	* Wt. n-Val.	*	* 0.050	*
* W.S. Elev (ft)	* 5448.54	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 5441.83	* Flow Area (sq ft)	*	* 455.24	*
* E.G. Slope (ft/ft)	*0.002602	* Area (sq ft)	*	* 455.24	*
* Q Total (cfs)	* 1500.00	* Flow (cfs)	*	* 1500.00	*
* Top Width (ft)	* 105.00	* Top Width (ft)	*	* 105.00	*
* Vel Total (ft/s)	* 3.29	* Avg. Vel. (ft/s)	*	* 3.29	*
* Max Chl Dpth (ft)	* 18.54	* Hydr. Depth (ft)	*	* 4.34	*
* Conv. Total (cfs)	* 29405.3	* Conv. (cfs)	*	* 29405.3	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 142.07	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.52	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 1.72	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #25 Yr

E.G. Elev (ft)	5449.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.050	
W.S. Elev (ft)	5448.89	Reach Len. (ft)			
Crit W.S. (ft)	5442.30	Flow Area (sq ft)		492.11	
E.G. Slope (ft/ft)	*0.002602	Area (sq ft)		492.11	
Q Total (cfs)	1702.18	Flow (cfs)		1702.18	
Top Width (ft)	105.00	Top Width (ft)		105.00	
Vel Total (ft/s)	3.46	Avg. Vel. (ft/s)		3.46	
Max Chl Dpth (ft)	18.89	Hydr. Depth (ft)		4.69	
Conv. Total (cfs)	33370.1	Conv. (cfs)		33370.1	
Length Wtd. (ft)		Wetted Per. (ft)		142.77	
Min Ch El (ft)	5430.00	Shear (lb/sq ft)		0.56	
Alpha	1.00	Stream Power (lb/ft s)		1.94	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 26

E.G. Elev (ft)	5449.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.050	
W.S. Elev (ft)	5449.38	Reach Len. (ft)			
Crit W.S. (ft)	5442.84	Flow Area (sq ft)		543.43	
E.G. Slope (ft/ft)	*0.002604	Area (sq ft)		543.43	
Q Total (cfs)	2000.00	Flow (cfs)		2000.00	
Top Width (ft)	105.00	Top Width (ft)		105.00	
Vel Total (ft/s)	3.68	Avg. Vel. (ft/s)		3.68	
Max Chl Dpth (ft)	19.38	Hydr. Depth (ft)		5.18	
Conv. Total (cfs)	39190.9	Conv. (cfs)		39190.9	
Length Wtd. (ft)		Wetted Per. (ft)		143.75	
Min Ch El (ft)	5430.00	Shear (lb/sq ft)		0.61	
Alpha	1.00	Stream Power (lb/ft s)		2.26	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #50 Yr

E.G. Elev (ft)	5449.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.050	
W.S. Elev (ft)	5449.75	Reach Len. (ft)			
Crit W.S. (ft)	5444.69	Flow Area (sq ft)		582.29	
E.G. Slope (ft/ft)	*0.002602	Area (sq ft)		582.29	
Q Total (cfs)	2235.26	Flow (cfs)		2235.26	
Top Width (ft)	105.00	Top Width (ft)		105.00	
Vel Total (ft/s)	3.84	Avg. Vel. (ft/s)		3.84	
Max Chl Dpth (ft)	19.75	Hydr. Depth (ft)		5.55	
Conv. Total (cfs)	43822.3	Conv. (cfs)		43822.3	
Length Wtd. (ft)		Wetted Per. (ft)		144.49	
Min Ch El (ft)	5430.00	Shear (lb/sq ft)		0.65	
Alpha	1.00	Stream Power (lb/ft s)		2.51	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 28

E.G. Elev (ft)	5450.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.050	
W.S. Elev (ft)	5450.36	Reach Len. (ft)			
Crit W.S. (ft)	5445.04	Flow Area (sq ft)		652.98	
E.G. Slope (ft/ft)	*0.002600	Area (sq ft)		652.98	
Q Total (cfs)	2500.00	Flow (cfs)		2500.00	
Top Width (ft)	122.45	Top Width (ft)		122.45	
Vel Total (ft/s)	3.83	Avg. Vel. (ft/s)		3.83	

* Max Chl Dpth (ft)	* 20.36	* Hydr. Depth (ft)	*	* 5.33	*			
* Conv. Total (cfs)	* 49025.1	* Conv. (cfs)	*	* 49025.1	*			
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 162.62	*			
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.65	*			
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.50	*			
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*			
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*			

CROSS SECTION OUTPUT Profile #PF 29

* E.G. Elev (ft)	* 5450.94	* Element	* Left OB	* Channel	* Right OB			
* Vel Head (ft)	* 0.24	* Wt. n-Val.	*	* 0.050	*			
* W.S. Elev (ft)	* 5450.69	* Reach Len. (ft)	*	*	*			
* Crit W.S. (ft)	* 5445.31	* Flow Area (sq ft)	*	* 693.92	*			
* E.G. Slope (ft/ft)	*0.002601	* Area (sq ft)	*	* 693.92	*			
* Q Total (cfs)	* 2750.00	* Flow (cfs)	*	* 2750.00	*			
* Top Width (ft)	* 123.78	* Top Width (ft)	*	* 123.78	*			
* Vel Total (ft/s)	* 3.96	* Avg. Vel. (ft/s)	*	* 3.96	*			
* Max Chl Dpth (ft)	* 20.69	* Hydr. Depth (ft)	*	* 5.61	*			
* Conv. Total (cfs)	* 53925.6	* Conv. (cfs)	*	* 53925.6	*			
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 164.10	*			
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.69	*			
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.72	*			
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*			
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*			

CROSS SECTION OUTPUT Profile #100 Yr

* E.G. Elev (ft)	* 5451.08	* Element	* Left OB	* Channel	* Right OB			
* Vel Head (ft)	* 0.25	* Wt. n-Val.	*	* 0.050	*			
* W.S. Elev (ft)	* 5450.83	* Reach Len. (ft)	*	*	*			
* Crit W.S. (ft)	* 5445.46	* Flow Area (sq ft)	*	* 711.00	*			
* E.G. Slope (ft/ft)	*0.002601	* Area (sq ft)	*	* 711.00	*			
* Q Total (cfs)	* 2856.65	* Flow (cfs)	*	* 2856.65	*			
* Top Width (ft)	* 124.33	* Top Width (ft)	*	* 124.33	*			
* Vel Total (ft/s)	* 4.02	* Avg. Vel. (ft/s)	*	* 4.02	*			
* Max Chl Dpth (ft)	* 20.83	* Hydr. Depth (ft)	*	* 5.72	*			
* Conv. Total (cfs)	* 56016.0	* Conv. (cfs)	*	* 56016.0	*			
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 164.72	*			
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.70	*			
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.82	*			
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*			
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*			

CROSS SECTION OUTPUT Profile #PF 31

* E.G. Elev (ft)	* 5451.27	* Element	* Left OB	* Channel	* Right OB			
* Vel Head (ft)	* 0.26	* Wt. n-Val.	*	* 0.050	*			
* W.S. Elev (ft)	* 5451.01	* Reach Len. (ft)	*	*	*			
* Crit W.S. (ft)	* 5445.53	* Flow Area (sq ft)	*	* 733.71	*			
* E.G. Slope (ft/ft)	*0.002600	* Area (sq ft)	*	* 733.71	*			
* Q Total (cfs)	* 3000.00	* Flow (cfs)	*	* 3000.00	*			
* Top Width (ft)	* 125.05	* Top Width (ft)	*	* 125.05	*			
* Vel Total (ft/s)	* 4.09	* Avg. Vel. (ft/s)	*	* 4.09	*			
* Max Chl Dpth (ft)	* 21.01	* Hydr. Depth (ft)	*	* 5.87	*			
* Conv. Total (cfs)	* 58835.8	* Conv. (cfs)	*	* 58835.8	*			
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 165.53	*			
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.72	*			
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.94	*			
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*			
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*			

CROSS SECTION OUTPUT Profile #PF 32

* E.G. Elev (ft)	* 5451.59	* Element	* Left OB	* Channel	* Right OB

* Vel Head (ft)	* 0.28	* Wt. n-Val.	*	* 0.050	*	*	*	*
* W.S. Elev (ft)	* 5451.32	* Reach Len. (ft)	*	*	*	*	*	*
* Crit W.S. (ft)	* 5447.21	* Flow Area (sq ft)	*	* 771.94	*	*	*	*
* E.G. Slope (ft/ft)	*0.002604	* Area (sq ft)	*	* 771.94	*	*	*	*
* Q Total (cfs)	* 3250.00	* Flow (cfs)	*	* 3250.00	*	*	*	*
* Top Width (ft)	* 126.27	* Top Width (ft)	*	* 126.27	*	*	*	*
* Vel Total (ft/s)	* 4.21	* Avg. Vel. (ft/s)	*	* 4.21	*	*	*	*
* Max Chl Dpth (ft)	* 21.32	* Hydr. Depth (ft)	*	* 6.11	*	*	*	*
* Conv. Total (cfs)	* 63684.5	* Conv. (cfs)	*	* 63684.5	*	*	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 166.89	*	*	*	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.75	*	*	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 3.17	*	*	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*	*	*

CROSS SECTION OUTPUT Profile #PF 33

* E.G. Elev (ft)	* 5451.91	* Element	*	Left OB *	Channel	*	Right OB	*
* Vel Head (ft)	* 0.29	* Wt. n-Val.	*	* 0.050	*	*	*	*
* W.S. Elev (ft)	* 5451.62	* Reach Len. (ft)	*	*	*	*	*	*
* Crit W.S. (ft)	* 5447.44	* Flow Area (sq ft)	*	* 809.72	*	*	*	*
* E.G. Slope (ft/ft)	*0.002603	* Area (sq ft)	*	* 809.72	*	*	*	*
* Q Total (cfs)	* 3500.00	* Flow (cfs)	*	* 3500.00	*	*	*	*
* Top Width (ft)	* 127.46	* Top Width (ft)	*	* 127.46	*	*	*	*
* Vel Total (ft/s)	* 4.32	* Avg. Vel. (ft/s)	*	* 4.32	*	*	*	*
* Max Chl Dpth (ft)	* 21.62	* Hydr. Depth (ft)	*	* 6.35	*	*	*	*
* Conv. Total (cfs)	* 68600.1	* Conv. (cfs)	*	* 68600.1	*	*	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 168.23	*	*	*	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.78	*	*	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 3.38	*	*	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*	*	*

CROSS SECTION OUTPUT Profile #PF 34

* E.G. Elev (ft)	* 5452.21	* Element	*	Left OB *	Channel	*	Right OB	*
* Vel Head (ft)	* 0.30	* Wt. n-Val.	*	* 0.050	*	*	*	*
* W.S. Elev (ft)	* 5451.90	* Reach Len. (ft)	*	*	*	*	*	*
* Crit W.S. (ft)	* 5447.52	* Flow Area (sq ft)	*	* 846.61	*	*	*	*
* E.G. Slope (ft/ft)	*0.002602	* Area (sq ft)	*	* 846.61	*	*	*	*
* Q Total (cfs)	* 3750.00	* Flow (cfs)	*	* 3750.00	*	*	*	*
* Top Width (ft)	* 128.62	* Top Width (ft)	*	* 128.62	*	*	*	*
* Vel Total (ft/s)	* 4.43	* Avg. Vel. (ft/s)	*	* 4.43	*	*	*	*
* Max Chl Dpth (ft)	* 21.90	* Hydr. Depth (ft)	*	* 6.58	*	*	*	*
* Conv. Total (cfs)	* 73512.3	* Conv. (cfs)	*	* 73512.3	*	*	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 169.51	*	*	*	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.81	*	*	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 3.59	*	*	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*	*	*

CROSS SECTION OUTPUT Profile #PF 35

* E.G. Elev (ft)	* 5452.50	* Element	*	Left OB *	Channel	*	Right OB	*
* Vel Head (ft)	* 0.32	* Wt. n-Val.	*	* 0.050	*	*	*	*
* W.S. Elev (ft)	* 5452.18	* Reach Len. (ft)	*	*	*	*	*	*
* Crit W.S. (ft)	* 5447.68	* Flow Area (sq ft)	*	* 882.75	*	*	*	*
* E.G. Slope (ft/ft)	*0.002601	* Area (sq ft)	*	* 882.75	*	*	*	*
* Q Total (cfs)	* 4000.00	* Flow (cfs)	*	* 4000.00	*	*	*	*
* Top Width (ft)	* 129.73	* Top Width (ft)	*	* 129.73	*	*	*	*
* Vel Total (ft/s)	* 4.53	* Avg. Vel. (ft/s)	*	* 4.53	*	*	*	*
* Max Chl Dpth (ft)	* 22.18	* Hydr. Depth (ft)	*	* 6.80	*	*	*	*
* Conv. Total (cfs)	* 78431.2	* Conv. (cfs)	*	* 78431.2	*	*	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 170.77	*	*	*	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.84	*	*	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 3.80	*	*	*	*

* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

CROSS SECTION OUTPUT Profile #500 Yr

* E.G. Elev (ft)	* 5453.23	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.35	* Wt. n-Val.	*	* 0.050	* *
* W.S. Elev (ft)	* 5452.88	* Reach Len. (ft)	*	*	* *
* Crit W.S. (ft)	* 5448.07	* Flow Area (sq ft)	*	* 973.54	* *
* E.G. Slope (ft/ft)	*0.002601	* Area (sq ft)	*	* 973.54	* *
* Q Total (cfs)	* 4652.39	* Flow (cfs)	*	* 4652.39	* *
* Top Width (ft)	* 132.50	* Top Width (ft)	*	* 132.50	* *
* Vel Total (ft/s)	* 4.78	* Avg. Vel. (ft/s)	*	* 4.78	* *
* Max Chl Dpth (ft)	* 22.88	* Hydr. Depth (ft)	*	* 7.35	* *
* Conv. Total (cfs)	* 91231.0	* Conv. (cfs)	*	* 91231.0	* *
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 173.86	* *
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.91	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 4.34	* *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	* *
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	* *

CROSS SECTION OUTPUT Profile #PF 37

* E.G. Elev (ft)	* 5453.60	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.37	* Wt. n-Val.	*	* 0.050	* *
* W.S. Elev (ft)	* 5453.22	* Reach Len. (ft)	*	*	* *
* Crit W.S. (ft)	* 5448.26	* Flow Area (sq ft)	*	* 1019.65	* *
* E.G. Slope (ft/ft)	*0.002605	* Area (sq ft)	*	* 1019.65	* *
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	* *
* Top Width (ft)	* 133.89	* Top Width (ft)	*	* 133.89	* *
* Vel Total (ft/s)	* 4.90	* Avg. Vel. (ft/s)	*	* 4.90	* *
* Max Chl Dpth (ft)	* 23.22	* Hydr. Depth (ft)	*	* 7.62	* *
* Conv. Total (cfs)	* 97965.3	* Conv. (cfs)	*	* 97965.3	* *
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 175.41	* *
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.95	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 4.64	* *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	* *
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	* *

CROSS SECTION OUTPUT Profile #PF 38

* E.G. Elev (ft)	* 5454.11	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.40	* Wt. n-Val.	*	* 0.050	* *
* W.S. Elev (ft)	* 5453.71	* Reach Len. (ft)	*	*	* *
* Crit W.S. (ft)	* 5448.57	* Flow Area (sq ft)	*	* 1085.43	* *
* E.G. Slope (ft/ft)	*0.002602	* Area (sq ft)	*	* 1085.43	* *
* Q Total (cfs)	* 5500.00	* Flow (cfs)	*	* 5500.00	* *
* Top Width (ft)	* 135.84	* Top Width (ft)	*	* 135.84	* *
* Vel Total (ft/s)	* 5.07	* Avg. Vel. (ft/s)	*	* 5.07	* *
* Max Chl Dpth (ft)	* 23.71	* Hydr. Depth (ft)	*	* 7.99	* *
* Conv. Total (cfs)	*107832.3	* Conv. (cfs)	*	*107832.3	* *
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 177.59	* *
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 0.99	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 5.03	* *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	* *
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	* *

CROSS SECTION OUTPUT Profile #PF 39

* E.G. Elev (ft)	* 5454.60	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.42	* Wt. n-Val.	*	* 0.050	* *
* W.S. Elev (ft)	* 5454.18	* Reach Len. (ft)	*	*	* *
* Crit W.S. (ft)	* 5448.86	* Flow Area (sq ft)	*	* 1149.14	* *
* E.G. Slope (ft/ft)	*0.002600	* Area (sq ft)	*	* 1149.14	* *
* Q Total (cfs)	* 6000.00	* Flow (cfs)	*	* 6000.00	* *

* Top Width (ft)	* 137.70	* Top Width (ft)	*	* 137.70	*	*		
* Vel Total (ft/s)	* 5.22	* Avg. Vel. (ft/s)	*	* 5.22	*	*		
* Max Chl Dpth (ft)	* 24.18	* Hydr. Depth (ft)	*	* 8.35	*	*		
* Conv. Total (cfs)	*117667.9	* Conv. (cfs)	*	*117667.9	*	*		
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 179.67	*	*		
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 1.04	*	*		
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 5.42	*	*		
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*		
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*		

CROSS SECTION OUTPUT Profile #PF 40

* E.G. Elev (ft)	* 5455.52	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.47	* Wt. n-Val.	*	* 0.050	*	*
* W.S. Elev (ft)	* 5455.05	* Reach Len. (ft)	*	*	*	*
* Crit W.S. (ft)	* 5449.35	* Flow Area (sq ft)	*	* 1271.23	*	*
* E.G. Slope (ft/ft)	*0.002601	* Area (sq ft)	*	* 1271.23	*	*
* Q Total (cfs)	* 7000.00	* Flow (cfs)	*	* 7000.00	*	*
* Top Width (ft)	* 141.21	* Top Width (ft)	*	* 141.21	*	*
* Vel Total (ft/s)	* 5.51	* Avg. Vel. (ft/s)	*	* 5.51	*	*
* Max Chl Dpth (ft)	* 25.05	* Hydr. Depth (ft)	*	* 9.00	*	*
* Conv. Total (cfs)	*137246.7	* Conv. (cfs)	*	*137246.7	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 183.59	*	*
* Min Ch El (ft)	* 5430.00	* Shear (lb/sq ft)	*	* 1.12	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 6.19	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*

SUMMARY OF MANNING'S N VALUES

River:Pinabete

Reach	River Sta.	n1	n2	n3
Diversion	2.500	.035	.035	.035
Diversion	1.014	.035	.035	.035
Diversion	1.002	.035	.05	.035
Diversion	1.001	.035	.05	.035
Diversion	1.000	.035	.05	.035

Profile Output Table - User Table1

Reach	River Sta	Profile	Q Total (cfs)	Vel Chnl (ft/s)	W.S. Elev (ft)	Min Ch El (ft)
Diversion	1.000	PF 1	0.01	0.14	5430.02	5430.00
Diversion	1.000	PF 2	10.00	1.25	5432.33	5430.00
Diversion	1.000	PF 3	20.00	1.56	5433.14	5430.00
Diversion	1.000	PF 4	30.00	1.76	5433.85	5430.00
Diversion	1.000	PF 5	40.00	1.90	5434.51	5430.00
Diversion	1.000	PF 6	50.00	1.87	5435.31	5430.00
Diversion	1.000	PF 7	60.00	1.98	5435.71	5430.00
Diversion	1.000	PF 8	70.00	2.07	5436.09	5430.00
Diversion	1.000	PF 9	80.00	2.15	5436.46	5430.00
Diversion	1.000	PF 10	90.00	2.23	5436.82	5430.00
Diversion	1.000	PF 11	100.00	2.30	5437.17	5430.00
Diversion	1.000	PF 12	200.00	2.59	5439.74	5430.00
Diversion	1.000	PF 13	300.00	2.76	5441.60	5430.00
Diversion	1.000	2 Yr	403.97	3.05	5442.74	5430.00
Diversion	1.000	PF 15	500.00	3.26	5443.72	5430.00
Diversion	1.000	PF 16	600.00	2.95	5444.99	5430.00
Diversion	1.000	PF 17	700.00	3.12	5445.45	5430.00
Diversion	1.000	P5 Yr	768.99	3.23	5445.76	5430.00
Diversion	1.000	PF 19	800.00	3.28	5445.89	5430.00
Diversion	1.000	PF 20	900.00	3.42	5446.31	5430.00
Diversion	1.000	PF 21	1000.00	3.55	5446.72	5430.00
Diversion	1.000	10 Yr	1116.63	2.94	5447.82	5430.00
Diversion	1.000	PF 23	1250.00	3.07	5448.08	5430.00
Diversion	1.000	PF 24	1500.00	3.29	5448.54	5430.00
Diversion	1.000	25 Yr	1702.18	3.46	5448.89	5430.00
Diversion	1.000	PF 26	2000.00	3.68	5449.38	5430.00
Diversion	1.000	50 Yr	2235.26	3.84	5449.75	5430.00
Diversion	1.000	PF 28	2500.00	3.83	5450.36	5430.00
Diversion	1.000	PF 29	2750.00	3.96	5450.69	5430.00
Diversion	1.000	100 Yr	2856.65	4.02	5450.83	5430.00
Diversion	1.000	PF 31	3000.00	4.09	5451.01	5430.00
Diversion	1.000	PF 32	3250.00	4.21	5451.32	5430.00
Diversion	1.000	PF 33	3500.00	4.32	5451.62	5430.00
Diversion	1.000	PF 34	3750.00	4.43	5451.90	5430.00
Diversion	1.000	PF 35	4000.00	4.53	5452.18	5430.00
Diversion	1.000	500 Yr	4652.39	4.78	5452.88	5430.00
Diversion	1.000	PF 37	5000.00	4.90	5453.22	5430.00
Diversion	1.000	PF 38	5500.00	5.07	5453.71	5430.00
Diversion	1.000	PF 39	6000.00	5.22	5454.18	5430.00
Diversion	1.000	PF 40	7000.00	5.51	5455.05	5430.00

Attachment 26.A-B.2

```
                    HEC-RAS Version 4.0.0 March 2008
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


           X     X  XXXXXX    XXXX        XXXX       XX      XXXX
           X     X  X        X    X       X   X     X  X    X
           X     X  X        X            X   X    X    X   X
           XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
           X     X  X        X            X  X     X    X        X
           X     X  X        X    X       X   X    X    X        X
           X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


********************************************************************************

PROJECT DATA
Project Title: Pinabete Diversion
Project File : PinabeteDiversion.prj
Run Date and Time:

Project in English units

********************************************************************************

PLAN DATA

Plan Title:
Plan File :

          Geometry Title: Transition Structure
          Geometry    File    :    s:\4010-00060    BHPB-Navajo    Mine    Extension    Project\Pinabete
Diversion\Modeling\PAP Submittal\HECRAS\PinabeteDiversion.g03

          Flow Title    : Flow 02
          Flow   File              :   s:\4010-00060   BHPB-Navajo   Mine   Extension   Project\Pinabete
Diversion\Modeling\PAP Submittal\HECRAS\PinabeteDiversion.f02

Plan Summary Information:
Number of:  Cross Sections =  121    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Mixed Flow


********************************************************************************
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FLOW DATA

Flow Title: Flow 02
Flow File : s:\4010-00060 BHPB-Navajo Mine Extension Project\Pinabete Diversion\Modeling\PAP Submittal\HECRAS\PinabeteDiversion.f02

Flow Data (cfs)

River	Reach	RS	Normal	10YR	100YR
Diversion	PINABETE	2000	133	574	2430

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Diversion	PINABETE	Normal	Normal S = 0.000204	Normal S = 0.0065
Diversion	PINABETE	10YR	Normal S = 0.000204	Normal S = 0.0065
Diversion	PINABETE	100YR	Normal S = 0.000204	Normal S = 0.0065

GEOMETRY DATA

Geometry Title: Transition Structure
Geometry File : s:\4010-00060 BHPB-Navajo Mine Extension Project\Pinabete Diversion\Modeling\PAP Submittal\HECRAS\PinabeteDiversion.g03

SUMMARY OF MANNING'S N VALUES

River:Diversion

Reach	River Sta.	n1	n2	n3
PINABETE	2000	.03	.03	.03
PINABETE	1900	.03	.03	.03
PINABETE	1800	.03	.03	.03
PINABETE	1700	.03	.03	.03
PINABETE	1600	.03	.03	.03
PINABETE	1500	.03	.03	.03
PINABETE	1400	.03	.03	.03
PINABETE	1350	.03	.03	.03
PINABETE	1300	.03	.03	.03
PINABETE	1250	.03	.03	.03
PINABETE	1200	.03	.03	.03
PINABETE	1150	.03	.03	.03
PINABETE	1100	.03	.03	.03
PINABETE	1050	.03	.03	.03
PINABETE	1000	.03	.03	.03
PINABETE	950	.03	.03	.03
PINABETE	900	.03	.03	.03
PINABETE	850	.03	.03	.03
PINABETE	800	.03	.03	.03

Profile Output Table - User Table1

Reach	River Sta	Profile	Q Total (cfs)	Vel Chnl (ft/s)	W.S. Elev (ft)	Min Ch El (ft)
PINABETE	800	Normal	133.00	4.08	5408.37	5405.56
PINABETE	800	10YR	574.00	5.83	5409.96	5405.56
PINABETE	800	100YR	2430.00	7.29	5412.55	5405.56
PINABETE	850	Normal	133.00	2.03	5408.86	5406.34
PINABETE	850	10YR	574.00	3.35	5410.59	5406.34
PINABETE	850	100YR	2430.00	4.13	5413.34	5406.34
PINABETE	900	Normal	133.00	4.94	5409.15	5406.71
PINABETE	900	10YR	574.00	11.18	5410.03	5406.71
PINABETE	900	100YR	2430.00	11.08	5412.89	5406.71
PINABETE	950	Normal	133.00	4.07	5409.76	5407.49
PINABETE	950	10YR	574.00	5.48	5412.27	5407.49
PINABETE	950	100YR	2430.00	7.70	5414.76	5407.49
PINABETE	1000	Normal	133.00	2.69	5410.29	5407.94
PINABETE	1000	10YR	574.00	4.04	5412.73	5407.94
PINABETE	1000	100YR	2430.00	6.21	5415.53	5407.94
PINABETE	1050	Normal	133.00	1.87	5410.40	5407.97
PINABETE	1050	10YR	574.00	3.31	5412.87	5407.97
PINABETE	1050	100YR	2430.00	5.76	5415.89	5407.97
PINABETE	1100	Normal	133.00	1.35	5410.46	5407.88
PINABETE	1100	10YR	574.00	2.38	5412.99	5407.88
PINABETE	1100	100YR	2430.00	4.81	5416.22	5407.88
PINABETE	1200	Normal	133.00	1.30	5410.50	5408.09
PINABETE	1200	10YR	574.00	1.93	5413.07	5408.09
PINABETE	1200	100YR	2430.00	3.77	5416.56	5408.09
PINABETE	1300	Normal	133.00	1.54	5410.54	5408.29
PINABETE	1300	10YR	574.00	2.06	5413.10	5408.29
PINABETE	1300	100YR	2430.00	3.95	5416.62	5408.29
PINABETE	1400	Normal	133.00	1.78	5410.60	5408.49
PINABETE	1400	10YR	574.00	2.58	5413.13	5408.49
PINABETE	1400	100YR	2430.00	4.85	5416.63	5408.49
PINABETE	1500	Normal	133.00	1.94	5410.68	5408.70
PINABETE	1500	10YR	574.00	2.72	5413.19	5408.70
PINABETE	1500	100YR	2430.00	4.43	5416.84	5408.70
PINABETE	1600	Normal	133.00	2.07	5410.79	5408.90
PINABETE	1600	10YR	574.00	2.94	5413.25	5408.90
PINABETE	1600	100YR	2430.00	5.14	5416.92	5408.90
PINABETE	1700	Normal	133.00	2.19	5410.92	5409.10
PINABETE	1700	10YR	574.00	3.05	5413.32	5409.10
PINABETE	1700	100YR	2430.00	5.67	5417.01	5409.10
PINABETE	1800	Normal	133.00	2.28	5411.08	5409.31
PINABETE	1800	10YR	574.00	3.18	5413.40	5409.31
PINABETE	1800	100YR	2430.00	5.74	5417.14	5409.31
PINABETE	1900	Normal	133.00	2.34	5411.25	5409.51
PINABETE	1900	10YR	574.00	3.29	5413.49	5409.51
PINABETE	1900	100YR	2430.00	5.81	5417.28	5409.51
PINABETE	2000	Normal	133.00	2.39	5411.44	5409.72
PINABETE	2000	10YR	574.00	3.40	5413.60	5409.72
PINABETE	2000	100YR	2430.00	5.88	5417.42	5409.72

ATTACHMENT 26.A-C FLOWMASTER REPORTS

Attachment 26.A-C.1.1 - Diversion Channel WSEL-10yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00204	ft/ft
Discharge	574.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+38	21.00
0+78	1.00
1+00	0.00
1+23	1.00
1+63	21.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+38, 21.00)	(1+63, 21.00)	0.030

Results

Normal Depth		3.35	ft
Elevation Range	0.00 to 21.00 ft		
Flow Area		139.12	ft²
Wetted Perimeter		55.54	ft
Top Width		54.39	ft
Normal Depth		3.35	ft
Critical Depth		2.21	ft
Critical Slope		0.01139	ft/ft
Velocity		4.13	ft/s
Velocity Head		0.26	ft
Specific Energy		3.61	ft
Froude Number		0.45	
Flow Type	Subcritical		

Attachment 26.A-C.1.1 - Diversion Channel WSEL-10yr

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.35	ft
Critical Depth	2.21	ft
Channel Slope	0.00204	ft/ft
Critical Slope	0.01139	ft/ft

Attachment 26.A-C.1.2 - Diversion Channel WSEL-100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00204	ft/ft
Discharge	2430.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+38	21.00
0+78	1.00
1+00	0.00
1+23	1.00
1+63	21.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+38, 21.00)	(1+63, 21.00)	0.030

Results

Normal Depth		7.03	ft
Elevation Range	0.00 to 21.00 ft		
Flow Area		366.91	ft²
Wetted Perimeter		72.03	ft
Top Width		69.14	ft
Normal Depth		7.03	ft
Critical Depth		4.81	ft
Critical Slope		0.00883	ft/ft
Velocity		6.62	ft/s
Velocity Head		0.68	ft
Specific Energy		7.72	ft
Froude Number		0.51	
Flow Type	Subcritical		

Attachment 26.A-C.1.2 - Diversion Channel WSEL-100yr

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.03	ft
Critical Depth	4.81	ft
Channel Slope	0.00204	ft/ft
Critical Slope	0.00883	ft/ft

Attachment 26.A-C.1.3 - Diversion Channel WSEL-1000yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00204	ft/ft
Discharge	5100.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+38	21.00
0+78	1.00
1+00	0.00
1+23	1.00
1+63	21.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+38, 21.00)	(1+63, 21.00)	0.030

Results

Normal Depth		10.33	ft
Elevation Range	0.00 to 21.00 ft		
Flow Area		616.75	ft²
Wetted Perimeter		86.79	ft
Top Width		82.33	ft
Normal Depth		10.33	ft
Critical Depth		7.28	ft
Critical Slope		0.00787	ft/ft
Velocity		8.27	ft/s
Velocity Head		1.06	ft
Specific Energy		11.40	ft
Froude Number		0.53	
Flow Type	Subcritical		

Attachment 26.A-C.1.3 - Diversion Channel WSEL-1000yr

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	10.33	ft
Critical Depth	7.28	ft
Channel Slope	0.00204	ft/ft
Critical Slope	0.00787	ft/ft

Attachment 26.A-C.2.1 - Diversion East Seg1 WSEL-100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00250	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	244.27	ft^3/s

Results

Normal Depth	2.96	ft
Flow Area	58.95	ft^2
Wetted Perimeter	27.23	ft
Top Width	25.84	ft
Critical Depth	1.92	ft
Critical Slope	0.01189	ft/ft
Velocity	4.14	ft/s
Velocity Head	0.27	ft
Specific Energy	3.23	ft
Froude Number	0.48	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.96	ft
Critical Depth	1.92	ft
Channel Slope	0.00250	ft/ft
Critical Slope	0.01189	ft/ft

Attachment 26.A-C.2.2 Diversion East Seg2 WSEL-100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00600	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	380.43	ft^3/s

Results

Normal Depth	2.97	ft
Flow Area	59.17	ft^2
Wetted Perimeter	27.27	ft
Top Width	25.87	ft
Critical Depth	2.51	ft
Critical Slope	0.01113	ft/ft
Velocity	6.43	ft/s
Velocity Head	0.64	ft
Specific Energy	3.61	ft
Froude Number	0.75	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.97	ft
Critical Depth	2.51	ft
Channel Slope	0.00600	ft/ft
Critical Slope	0.01113	ft/ft

Attachment 26.A-C.3.1 - Drop Structure-No Name

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00530	ft/ft
Bottom Width	30.00	ft
Discharge	937.00	ft^3/s

Results

Normal Depth	4.44	ft
Flow Area	133.32	ft^2
Wetted Perimeter	38.89	ft
Top Width	30.00	ft
Critical Depth	3.12	ft
Critical Slope	0.01572	ft/ft
Velocity	7.03	ft/s
Velocity Head	0.77	ft
Specific Energy	5.21	ft
Froude Number	0.59	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.44	ft
Critical Depth	3.12	ft
Channel Slope	0.00530	ft/ft
Critical Slope	0.01572	ft/ft

Attachment 26.A-C.3.2 - Drop Structure-Tributary

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01190	ft/ft
Bottom Width	15.00	ft
Discharge	332.00	ft^3/s

Results

Normal Depth	2.92	ft
Flow Area	43.73	ft^2
Wetted Perimeter	20.83	ft
Top Width	15.00	ft
Critical Depth	2.48	ft
Critical Slope	0.01930	ft/ft
Velocity	7.59	ft/s
Velocity Head	0.90	ft
Specific Energy	3.81	ft
Froude Number	0.78	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.92	ft
Critical Depth	2.48	ft
Channel Slope	0.01190	ft/ft
Critical Slope	0.01930	ft/ft

Attachment 26.A-C.4 - Transition (AA)

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00650	ft/ft
Normal Depth	2.58	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	5415.39
0+13	5415.48
0+17	5415.27
0+18	5415.41
0+18	5415.23
0+20	5414.47
0+22	5414.10
0+23	5413.25
0+24	5412.78
0+24	5412.53
0+28	5410.81
0+29	5410.74
0+29	5410.71
0+41	5410.33
0+42	5410.03
0+44	5409.10
0+47	5408.00
0+48	5407.72
0+49	5407.85
0+50	5408.01
0+53	5408.42
0+57	5409.42
0+58	5409.61
0+62	5411.36
0+62	5411.71
0+66	5414.90
0+70	5416.56

Attachment 26.A-C.4 - Transition (AA)

Input Data

Station (ft)	Elevation (ft)
0+71	5416.48
0+74	5415.98

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5415.39)	(1+00, 5417.38)	0.030

Results

Discharge		133.08	ft^3/s
Elevation Range	5407.72 to 5417.40 ft		
Flow Area		26.98	ft^2
Wetted Perimeter		19.65	ft
Top Width		18.89	ft
Normal Depth		2.58	ft
Critical Depth		2.26	ft
Critical Slope		0.01285	ft/ft
Velocity		4.93	ft/s
Velocity Head		0.38	ft
Specific Energy		2.96	ft
Froude Number		0.73	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

GVF Output Data

Normal Depth	2.58	ft
Critical Depth	2.26	ft
Channel Slope	0.00650	ft/ft
Critical Slope	0.01285	ft/ft

ATTACHMENT 26.A-D SEDCAD REPORTS- PINABETE DIVERSION DESIGN EVALUATIONS

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Attachment 26.A-D.1.1
PINABETE DIVERSION
BNCC Original

45' Bottom

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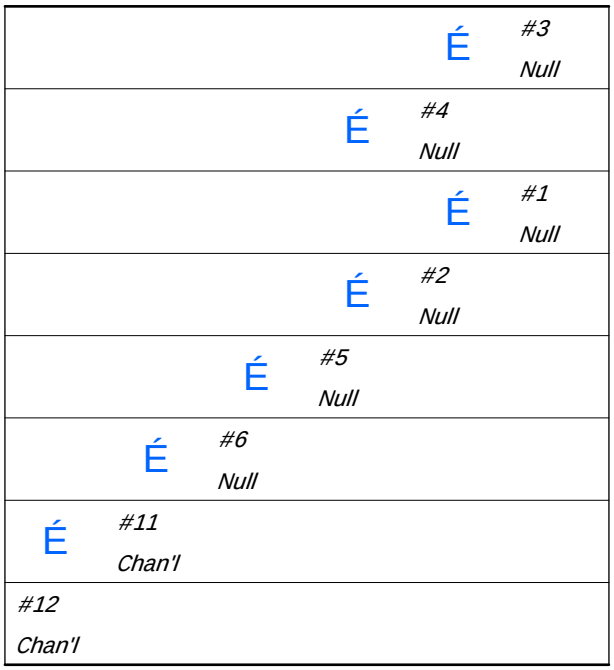
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	10 yr - 6 hr
Rainfall Depth:	1.280 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	1.674	0.331	
Null	#2	==>	#5	4.188	0.295	
Null	#3	==>	#4	1.961	0.319	
Null	#4	==>	#5	3.103	0.304	
Null	#5	==>	#6	1.300	0.273	
Null	#6	==>	#11	0.000	0.000	EAST LEASE BNDY
Channel	#11	==>	#12	2.188	0.258	45' Channel
Channel	#12	==>	End	0.000	0.000	Post-Channel



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.24	250.00	20,136.00	3.34	1.674
#1	**Muskingum K:**					**1.674**
#2	8. Large gullies, diversions, and low flowing streams	0.67	245.00	36,791.00	2.44	4.188
#2	**Muskingum K:**					**4.188**
#3	8. Large gullies, diversions, and low flowing streams	0.99	210.00	21,118.00	2.99	1.961

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	**Muskingum K:**					**1.961**
#4	8. Large gullies, diversions, and low flowing streams	0.77	227.00	29,388.00	2.63	3.103
#4	**Muskingum K:**					**3.103**
#5	8. Large gullies, diversions, and low flowing streams	0.47	45.00	9,601.00	2.05	1.300
#5	**Muskingum K:**					**1.300**
#11	8. Large gullies, diversions, and low flowing streams	0.37	52.20	14,263.00	1.81	2.188
#11	**Muskingum K:**					**2.188**

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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3	3,978.700	3,978.700	247.93	49.23
#4	3,216.100	7,194.800	369.85	107.27
#1	8,477.900	8,477.900	580.46	139.16
#2	3,838.900	12,316.800	770.34	255.55
#5	5,494.300	25,005.900	1,125.36	532.11
#6	3,079.300	28,085.200	1,116.63	614.58
#11	0.000	28,085.200	1,116.63	614.58
#12	0.000	28,085.200	1,098.28	614.58

Structure Detail:

Structure #3 (Null)

Structure #4 (Null)

Structure #1 (Null)

Structure #2 (Null)

Structure #5 (Null)

Structure #6 (Null)

EAST LEASE BNDY

Structure #11 (Erodible Channel)

45' Channel

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
45.00	2.0:1	2.0:1	0.4	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	1,116.63 cfs	
Depth:	3.77 ft	
Top Width:	60.10 ft	
Velocity:	5.63 fps	
X-Section Area:	198.35 sq ft	
Hydraulic Radius:	3.205 ft	
Froude Number:	0.55	

Structure #12 (Nonerodible Channel)

Post-Channel

Trapezoidal Nonerodible Channel Inputs:

Material: Asphaltic Concrete, Machine Placed

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
45.00	2.0:1	2.0:1	0.4	0.0140	2.00	50.00	

Nonerodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	1,098.28 cfs	
Depth:	2.20 ft	4.20 ft
Top Width:	53.82 ft	61.82 ft
Velocity:	10.09 fps	
X-Section Area:	108.89 sq ft	
Hydraulic Radius:	1.985 ft	
Froude Number:	1.25	

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#3	1	791.300	1.145	1.181	0.350	80.800	M	78.22	10.689
	2	1,079.100	0.915	0.596	0.351	80.900	M	127.23	14.750
	3	450.300	0.571	0.319	0.355	81.300	M	77.09	6.446
	4	742.600	0.625	0.000	0.000	78.500	M	82.23	7.605
	5	915.400	1.119	0.000	0.000	78.800	M	70.39	9.738
	Σ	**3,978.700**						**247.93**	**49.228**
#4	1	546.400	0.726	1.710	0.319	81.700	M	83.53	8.175
	2	441.200	0.503	1.429	0.318	86.000	M	141.35	10.341
	3	889.400	0.815	0.998	0.318	82.100	M	131.85	13.902
	4	1,339.100	0.919	0.000	0.000	84.000	M	227.47	25.621
	Σ	**7,194.800**						**369.85**	**107.266**
#1	1	1,242.300	1.349	1.359	0.354	80.800	M	108.51	16.777
	2	1,662.000	1.465	0.865	0.359	80.300	M	127.83	21.180
	3	1,434.000	1.573	1.257	0.357	81.100	M	115.61	20.041
	4	842.700	1.102	0.977	0.364	81.000	M	87.90	11.646
	5	676.100	1.067	1.113	0.365	81.600	M	77.83	9.998
	6	1,223.200	0.778	0.596	0.352	81.800	M	180.53	18.502
	7	743.100	0.745	0.530	0.354	83.600	M	139.81	13.639
	8	654.500	0.801	0.000	0.000	92.200	M	282.70	27.380
	Σ	**8,477.900**						**580.46**	**139.163**
#2	1	609.500	0.668	1.219	0.340	85.700	M	156.51	13.865
	2	537.100	0.610	1.436	0.329	91.600	M	263.40	21.301
	3	455.000	0.546	1.288	0.324	82.000	M	87.71	7.037
	4	627.000	0.634	0.852	0.324	87.900	M	209.54	17.639
	5	653.100	0.452	0.453	0.315	91.200	M	370.37	24.976
	6	957.200	0.984	0.000	0.000	89.600	M	278.74	31.573
	Σ	**12,316.800**						**770.34**	**255.553**
#5	1	763.100	0.682	3.507	0.293	84.100	M	161.84	14.756
	2	983.300	1.117	2.231	0.289	89.200	M	250.58	31.244
	3	1,022.000	0.996	1.587	0.291	92.000	M	371.69	41.995
	4	688.700	1.908	1.255	0.291	80.800	M	46.01	9.300
	5	754.300	2.307	1.084	0.287	86.200	M	79.78	17.997
	6	628.400	0.538	0.595	0.301	93.000	M	380.45	28.283
	7	654.500	0.560	0.000	0.000	91.500	M	335.86	25.719
	Σ	**25,005.900**						**1,125.36**	**532.113**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#6	1	901.400	1.151	1.896	0.315	81.100	M	92.19	12.600
	2	1,011.200	1.871	0.166	0.287	83.500	M	94.59	18.352
	3	1,166.700	1.126	0.000	0.000	92.800	M	418.06	51.511
	Σ	**28,085.200**						**1,116.63**	**614.576**
#11	Σ	**28,085.200**						**1,116.63**	**614.576**
#12	Σ	**28,085.200**						**1,098.28**	**614.576**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.99	22.00	736.00	1.720	0.118
		8. Large gullies, diversions, and low flowing streams	0.63	66.00	10,511.22	2.370	1.231
#1	**1**	**Time of Concentration:**					**1.349**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	6.24	30.00	481.00	2.490	0.053
		8. Large gullies, diversions, and low flowing streams	3.34	406.00	12,141.00	5.480	0.615
#2	**1**	**Time of Concentration:**					**0.668**
#2	2	5. Nearly bare and untilled, and alluvial valley fans	3.16	30.00	950.00	1.770	0.149
		8. Large gullies, diversions, and low flowing streams	4.22	432.00	10,229.00	6.160	0.461
#2	**2**	**Time of Concentration:**					**0.610**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	2.65	10.00	378.00	1.620	0.064
		8. Large gullies, diversions, and low flowing streams	2.72	234.00	8,592.00	4.950	0.482
#2	**3**	**Time of Concentration:**					**0.546**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	3.07	25.00	815.00	1.750	0.129
		8. Large gullies, diversions, and low flowing streams	3.32	330.00	9,931.00	5.460	0.505
#2	**4**	**Time of Concentration:**					**0.634**
#2	5	5. Nearly bare and untilled, and alluvial valley fans	7.45	45.00	604.00	2.720	0.061
		8. Large gullies, diversions, and low flowing streams	3.78	310.00	8,210.00	5.820	0.391
#2	**5**	**Time of Concentration:**					**0.452**
#2	6	5. Nearly bare and untilled, and alluvial valley fans	9.10	80.00	879.00	3.010	0.081

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	2.32	344.00	14,831.00	4.560	0.903
#2	**6**	**Time of Concentration:**					**0.984**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	1.29	15.00	1,163.00	1.130	0.285
		8. Large gullies, diversions, and low flowing streams	2.37	338.00	14,280.00	4.610	0.860
#3	**1**	**Time of Concentration:**					**1.145**
#3	2	5. Nearly bare and untilled, and alluvial valley fans	3.04	33.00	1,087.00	1.740	0.173
		8. Large gullies, diversions, and low flowing streams	2.06	238.00	11,527.00	4.310	0.742
#3	**2**	**Time of Concentration:**					**0.915**
#3	3	5. Nearly bare and untilled, and alluvial valley fans	5.02	45.00	897.00	2.230	0.111
		8. Large gullies, diversions, and low flowing streams	3.09	270.00	8,741.00	5.270	0.460
#3	**3**	**Time of Concentration:**					**0.571**
#3	4	5. Nearly bare and untilled, and alluvial valley fans	7.41	28.00	378.00	2.720	0.038
		8. Large gullies, diversions, and low flowing streams	3.43	402.00	11,736.00	5.550	0.587
#3	**4**	**Time of Concentration:**					**0.625**
#3	5	5. Nearly bare and untilled, and alluvial valley fans	3.39	30.00	885.00	1.840	0.133
		8. Large gullies, diversions, and low flowing streams	2.58	442.00	17,121.00	4.820	0.986
#3	**5**	**Time of Concentration:**					**1.119**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	3.59	62.00	1,729.00	1.890	0.254
		8. Large gullies, diversions, and low flowing streams	2.09	154.00	7,372.00	4.330	0.472
#4	**1**	**Time of Concentration:**					**0.726**
#4	2	5. Nearly bare and untilled, and alluvial valley fans	6.83	25.00	366.00	2.610	0.038
		8. Large gullies, diversions, and low flowing streams	2.36	182.00	7,708.00	4.600	0.465
#4	**2**	**Time of Concentration:**					**0.503**
#4	3	5. Nearly bare and untilled, and alluvial valley fans	19.03	47.00	247.00	4.360	0.015
		8. Large gullies, diversions, and low flowing streams	2.13	268.00	12,586.00	4.370	0.800
#4	**3**	**Time of Concentration:**					**0.815**
#4	4	5. Nearly bare and untilled, and alluvial valley fans	14.08	50.00	355.00	3.750	0.026
		8. Large gullies, diversions, and low flowing streams	2.46	372.00	15,119.00	4.700	0.893
#4	**4**	**Time of Concentration:**					**0.919**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	1	5. Nearly bare and untilled, and alluvial valley fans	12.55	65.00	518.00	3.540	0.040
		8. Large gullies, diversions, and low flowing streams	1.92	184.00	9,592.00	4.150	0.642
#5	**1**	**Time of Concentration:**					**0.682**
#5	2	5. Nearly bare and untilled, and alluvial valley fans	5.10	30.00	588.00	2.250	0.072
		8. Large gullies, diversions, and low flowing streams	1.77	266.00	15,016.00	3.990	1.045
#5	**2**	**Time of Concentration:**					**1.117**
#5	3	5. Nearly bare and untilled, and alluvial valley fans	1.90	20.00	1,050.00	1.380	0.211
		8. Large gullies, diversions, and low flowing streams	2.19	274.00	12,532.00	4.430	0.785
#5	**3**	**Time of Concentration:**					**0.996**
#5	4	5. Nearly bare and untilled, and alluvial valley fans	2.78	32.00	1,152.00	1.660	0.192
		8. Large gullies, diversions, and low flowing streams	0.99	182.00	18,415.00	2.980	1.716
#5	**4**	**Time of Concentration:**					**1.908**
#5	5	5. Nearly bare and untilled, and alluvial valley fans	2.52	23.00	911.00	1.580	0.160
		8. Large gullies, diversions, and low flowing streams	1.07	256.00	23,965.00	3.100	2.147
#5	**5**	**Time of Concentration:**					**2.307**
#5	6	5. Nearly bare and untilled, and alluvial valley fans	6.36	25.00	393.00	2.520	0.043
		8. Large gullies, diversions, and low flowing streams	2.39	198.00	8,272.00	4.640	0.495
#5	**6**	**Time of Concentration:**					**0.538**
#5	7	5. Nearly bare and untilled, and alluvial valley fans	9.66	28.00	290.00	3.100	0.025
		8. Large gullies, diversions, and low flowing streams	2.12	179.00	8,427.00	4.370	0.535
#5	**7**	**Time of Concentration:**					**0.560**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	31.83	120.00	377.00	5.640	0.018
		8. Large gullies, diversions, and low flowing streams	1.38	198.00	14,361.00	3.520	1.133
#6	**1**	**Time of Concentration:**					**1.151**
#6	2	5. Nearly bare and untilled, and alluvial valley fans	4.25	40.00	941.00	2.060	0.126
		8. Large gullies, diversions, and low flowing streams	0.96	176.00	18,407.00	2.930	1.745
#6	**2**	**Time of Concentration:**					**1.871**
#6	3	5. Nearly bare and untilled, and alluvial valley fans	4.35	25.00	575.00	2.080	0.076
		8. Large gullies, diversions, and low flowing streams	1.57	224.00	14,223.00	3.760	1.050

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#6	**3**	**Time of Concentration:**					**1.126**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.88	378.00	20,112.80	4.110	1.359
#1	**1**	**Muskingum K:**					**1.359**
#2	1	8. Large gullies, diversions, and low flowing streams	1.44	228.00	15,800.00	3.600	1.219
#2	**1**	**Muskingum K:**					**1.219**
#2	2	8. Large gullies, diversions, and low flowing streams	1.19	202.00	16,912.00	3.270	1.436
#2	**2**	**Muskingum K:**					**1.436**
#2	3	8. Large gullies, diversions, and low flowing streams	1.10	160.00	14,568.00	3.140	1.288
#2	**3**	**Muskingum K:**					**1.288**
#2	4	8. Large gullies, diversions, and low flowing streams	1.09	104.00	9,576.00	3.120	0.852
#2	**4**	**Muskingum K:**					**0.852**
#2	5	8. Large gullies, diversions, and low flowing streams	0.93	44.00	4,715.00	2.890	0.453
#2	**5**	**Muskingum K:**					**0.453**
#3	1	8. Large gullies, diversions, and low flowing streams	1.75	294.00	16,845.00	3.960	1.181
#3	**1**	**Muskingum K:**					**1.181**
#3	2	8. Large gullies, diversions, and low flowing streams	1.79	154.00	8,609.00	4.010	0.596
#3	**2**	**Muskingum K:**					**0.596**
#3	3	8. Large gullies, diversions, and low flowing streams	1.93	92.00	4,778.00	4.160	0.319
#3	**3**	**Muskingum K:**					**0.319**
#4	1	8. Large gullies, diversions, and low flowing streams	1.01	186.00	18,477.00	3.000	1.710
#4	**1**	**Muskingum K:**					**1.710**
#4	2	8. Large gullies, diversions, and low flowing streams	0.98	150.00	15,281.00	2.970	1.429
#4	**2**	**Muskingum K:**					**1.429**
#4	3	8. Large gullies, diversions, and low flowing streams	0.98	104.00	10,645.00	2.960	0.998
#4	**3**	**Muskingum K:**					**0.998**
#5	1	8. Large gullies, diversions, and low flowing streams	0.64	195.00	30,309.00	2.400	3.507
#5	**1**	**Muskingum K:**					**3.507**
#5	2	8. Large gullies, diversions, and low flowing streams	0.60	113.00	18,717.00	2.330	2.231

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	**2**	**Muskingum K:**					**2.231**
#5	3	8. Large gullies, diversions, and low flowing streams	0.63	85.00	13,541.00	2.370	1.587
#5	**3**	**Muskingum K:**					**1.587**
#5	4	8. Large gullies, diversions, and low flowing streams	0.63	67.00	10,710.00	2.370	1.255
#5	**4**	**Muskingum K:**					**1.255**
#5	5	8. Large gullies, diversions, and low flowing streams	0.59	53.00	8,978.00	2.300	1.084
#5	**5**	**Muskingum K:**					**1.084**
#5	6	8. Large gullies, diversions, and low flowing streams	0.74	41.00	5,528.00	2.580	0.595
#5	**6**	**Muskingum K:**					**0.595**
#6	1	8. Large gullies, diversions, and low flowing streams	0.94	186.00	19,797.00	2.900	1.896
#6	**1**	**Muskingum K:**					**1.896**
#6	2	8. Large gullies, diversions, and low flowing streams	0.58	8.00	1,372.00	2.290	0.166
#6	**2**	**Muskingum K:**					**0.166**

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Attachment 26.A-D.1.2

PINABETE DIVERSION

BNCC Original

45' Bottom

Michael Kendrick

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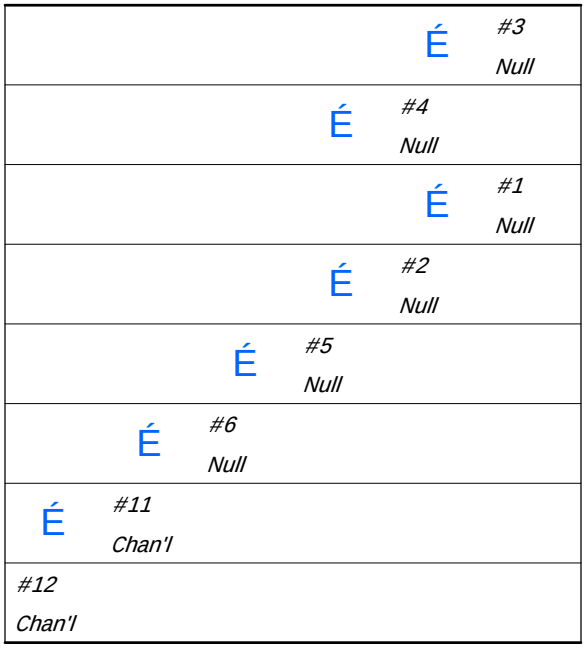
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	100 yr - 6 hr
Rainfall Depth:	2.040 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	1.674	0.331	
Null	#2	==>	#5	4.188	0.295	
Null	#3	==>	#4	1.961	0.319	
Null	#4	==>	#5	3.103	0.304	
Null	#5	==>	#6	1.300	0.273	
Null	#6	==>	#11	0.000	0.000	EAST LEASE BNDY
Channel	#11	==>	#12	2.188	0.258	45' Channel
Channel	#12	==>	End	0.000	0.000	Post-Channel



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.24	250.00	20,136.00	3.34	1.674
#1	**Muskingum K:**					**1.674**
#2	8. Large gullies, diversions, and low flowing streams	0.67	245.00	36,791.00	2.44	4.188
#2	**Muskingum K:**					**4.188**
#3	8. Large gullies, diversions, and low flowing streams	0.99	210.00	21,118.00	2.99	1.961
#3	**Muskingum K:**					**1.961**

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	8. Large gullies, diversions, and low flowing streams	0.77	227.00	29,388.00	2.63	3.103
#4	**Muskingum K:**					**3.103**
#5	8. Large gullies, diversions, and low flowing streams	0.47	45.00	9,601.00	2.05	1.300
#5	**Muskingum K:**					**1.300**
#11	8. Large gullies, diversions, and low flowing streams	0.37	52.20	14,263.00	1.81	2.188
#11	**Muskingum K:**					**2.188**

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3	3,978.700	3,978.700	840.39	155.26
#4	3,216.100	7,194.800	1,161.81	313.80
#1	8,477.900	8,477.900	1,758.29	389.46
#2	3,838.900	12,316.800	1,925.66	652.91
#5	5,494.300	25,005.900	2,878.92	1,345.50
#6	3,079.300	28,085.200	2,856.65	1,536.87
#11	0.000	28,085.200	2,856.65	1,536.87
#12	0.000	28,085.200	2,809.63	1,536.87

Structure Detail:

Structure #3 (Null)

Structure #4 (Null)

Structure #1 (Null)

Structure #2 (Null)

Structure #5 (Null)

Structure #6 (Null)

EAST LEASE BNDY

Structure #11 (Erodible Channel)

45' Channel

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
45.00	2.0:1	2.0:1	0.4	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	2,856.65 cfs	
Depth:	6.46 ft	
Top Width:	70.84 ft	
Velocity:	7.64 fps	
X-Section Area:	374.12 sq ft	
Hydraulic Radius:	5.063 ft	
Froude Number:	0.59	

Structure #12 (Nonerodible Channel)

Post-Channel

Trapezoidal Nonerodible Channel Inputs:

Material: Asphaltic Concrete, Machine Placed

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
45.00	2.0:1	2.0:1	0.4	0.0140	2.00	50.00	

Nonerodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	2,809.63 cfs	
Depth:	3.82 ft	5.82 ft
Top Width:	60.28 ft	68.28 ft
Velocity:	13.98 fps	
X-Section Area:	201.02 sq ft	
Hydraulic Radius:	3.238 ft	
Froude Number:	1.35	

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#3	1	791.300	1.145	1.181	0.350	80.800	M	252.88	32.619
	2	1,079.100	0.915	0.596	0.351	80.900	M	410.04	44.812
	3	450.300	0.571	0.319	0.355	81.300	M	244.20	19.245
	4	742.600	0.625	0.000	0.000	78.500	M	305.73	25.912
	5	915.400	1.119	0.000	0.000	78.800	M	254.63	32.672
	Σ	**3,978.700**						**840.39**	**155.260**
#4	1	546.400	0.726	1.710	0.319	81.700	M	259.48	23.994
	2	441.200	0.503	1.429	0.318	86.000	M	358.34	25.779
	3	889.400	0.815	0.998	0.318	82.100	M	401.16	40.129
	4	1,339.100	0.919	0.000	0.000	84.000	M	635.38	68.640
	Σ	**7,194.800**						**1,161.81**	**313.802**
#1	1	1,242.300	1.349	1.359	0.354	80.800	M	350.01	51.197
	2	1,662.000	1.465	0.865	0.359	80.300	M	422.54	66.107
	3	1,434.000	1.573	1.257	0.357	81.100	M	366.26	60.354
	4	842.700	1.102	0.977	0.364	81.000	M	281.43	35.225
	5	676.100	1.067	1.113	0.365	81.600	M	241.95	29.468
	6	1,223.200	0.778	0.596	0.352	81.800	M	557.61	54.077
	7	743.100	0.745	0.530	0.354	83.600	M	397.26	37.097
	8	654.500	0.801	0.000	0.000	92.200	M	585.23	55.938
	Σ	**8,477.900**						**1,758.29**	**389.465**
#2	1	609.500	0.668	1.219	0.340	85.700	M	404.67	34.927
	2	537.100	0.610	1.436	0.329	91.600	M	553.64	44.327
	3	455.000	0.546	1.288	0.324	82.000	M	267.07	20.396
	4	627.000	0.634	0.852	0.324	87.900	M	498.81	41.252
	5	653.100	0.452	0.453	0.315	91.200	M	780.45	52.619
	6	957.200	0.984	0.000	0.000	89.600	M	627.22	69.921
	Σ	**12,316.800**						**1,925.66**	**652.908**
#5	1	763.100	0.682	3.507	0.293	84.100	M	448.54	39.385
	2	983.300	1.117	2.231	0.289	89.200	M	572.37	70.073
	3	1,022.000	0.996	1.587	0.291	92.000	M	774.06	86.324
	4	688.700	1.908	1.255	0.291	80.800	M	147.50	28.380
	5	754.300	2.307	1.084	0.287	86.200	M	202.49	44.558
	6	628.400	0.538	0.595	0.301	93.000	M	758.23	56.383
	7	654.500	0.560	0.000	0.000	91.500	M	706.54	53.686
	Σ	**25,005.900**						**2,878.92**	**1,345.499**
#6	1	901.400	1.151	1.896	0.315	81.100	M	293.51	37.945

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
	2	1,011.200	1.871	0.166	0.287	83.500	M	267.73	50.109
	3	1,166.700	1.126	0.000	0.000	92.800	M	848.89	103.320
	Σ	**28,085.200**						**2,856.65**	**1,536.873**
#11	Σ	**28,085.200**						**2,856.65**	**1,536.873**
#12	Σ	**28,085.200**						**2,809.63**	**1,536.873**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.99	22.00	736.00	1.720	0.118
		8. Large gullies, diversions, and low flowing streams	0.63	66.00	10,511.22	2.370	1.231
#1	**1**	**Time of Concentration:**					**1.349**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	6.24	30.00	481.00	2.490	0.053
		8. Large gullies, diversions, and low flowing streams	3.34	406.00	12,141.00	5.480	0.615
#2	**1**	**Time of Concentration:**					**0.668**
#2	2	5. Nearly bare and untilled, and alluvial valley fans	3.16	30.00	950.00	1.770	0.149
		8. Large gullies, diversions, and low flowing streams	4.22	432.00	10,229.00	6.160	0.461
#2	**2**	**Time of Concentration:**					**0.610**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	2.65	10.00	378.00	1.620	0.064
		8. Large gullies, diversions, and low flowing streams	2.72	234.00	8,592.00	4.950	0.482
#2	**3**	**Time of Concentration:**					**0.546**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	3.07	25.00	815.00	1.750	0.129
		8. Large gullies, diversions, and low flowing streams	3.32	330.00	9,931.00	5.460	0.505
#2	**4**	**Time of Concentration:**					**0.634**
#2	5	5. Nearly bare and untilled, and alluvial valley fans	7.45	45.00	604.00	2.720	0.061
		8. Large gullies, diversions, and low flowing streams	3.78	310.00	8,210.00	5.820	0.391
#2	**5**	**Time of Concentration:**					**0.452**
#2	6	5. Nearly bare and untilled, and alluvial valley fans	9.10	80.00	879.00	3.010	0.081
		8. Large gullies, diversions, and low flowing streams	2.32	344.00	14,831.00	4.560	0.903
#2	**6**	**Time of Concentration:**					**0.984**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	1	5. Nearly bare and untilled, and alluvial valley fans	1.29	15.00	1,163.00	1.130	0.285
		8. Large gullies, diversions, and low flowing streams	2.37	338.00	14,280.00	4.610	0.860
#3	**1**	**Time of Concentration:**					**1.145**
#3	2	5. Nearly bare and untilled, and alluvial valley fans	3.04	33.00	1,087.00	1.740	0.173
		8. Large gullies, diversions, and low flowing streams	2.06	238.00	11,527.00	4.310	0.742
#3	**2**	**Time of Concentration:**					**0.915**
#3	3	5. Nearly bare and untilled, and alluvial valley fans	5.02	45.00	897.00	2.230	0.111
		8. Large gullies, diversions, and low flowing streams	3.09	270.00	8,741.00	5.270	0.460
#3	**3**	**Time of Concentration:**					**0.571**
#3	4	5. Nearly bare and untilled, and alluvial valley fans	7.41	28.00	378.00	2.720	0.038
		8. Large gullies, diversions, and low flowing streams	3.43	402.00	11,736.00	5.550	0.587
#3	**4**	**Time of Concentration:**					**0.625**
#3	5	5. Nearly bare and untilled, and alluvial valley fans	3.39	30.00	885.00	1.840	0.133
		8. Large gullies, diversions, and low flowing streams	2.58	442.00	17,121.00	4.820	0.986
#3	**5**	**Time of Concentration:**					**1.119**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	3.59	62.00	1,729.00	1.890	0.254
		8. Large gullies, diversions, and low flowing streams	2.09	154.00	7,372.00	4.330	0.472
#4	**1**	**Time of Concentration:**					**0.726**
#4	2	5. Nearly bare and untilled, and alluvial valley fans	6.83	25.00	366.00	2.610	0.038
		8. Large gullies, diversions, and low flowing streams	2.36	182.00	7,708.00	4.600	0.465
#4	**2**	**Time of Concentration:**					**0.503**
#4	3	5. Nearly bare and untilled, and alluvial valley fans	19.03	47.00	247.00	4.360	0.015
		8. Large gullies, diversions, and low flowing streams	2.13	268.00	12,586.00	4.370	0.800
#4	**3**	**Time of Concentration:**					**0.815**
#4	4	5. Nearly bare and untilled, and alluvial valley fans	14.08	50.00	355.00	3.750	0.026
		8. Large gullies, diversions, and low flowing streams	2.46	372.00	15,119.00	4.700	0.893
#4	**4**	**Time of Concentration:**					**0.919**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	12.55	65.00	518.00	3.540	0.040
		8. Large gullies, diversions, and low flowing streams	1.92	184.00	9,592.00	4.150	0.642
#5	**1**	**Time of Concentration:**					**0.682**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	2	5. Nearly bare and untilled, and alluvial valley fans	5.10	30.00	588.00	2.250	0.072
		8. Large gullies, diversions, and low flowing streams	1.77	266.00	15,016.00	3.990	1.045
#5	**2**	**Time of Concentration:**					**1.117**
#5	3	5. Nearly bare and untilled, and alluvial valley fans	1.90	20.00	1,050.00	1.380	0.211
		8. Large gullies, diversions, and low flowing streams	2.19	274.00	12,532.00	4.430	0.785
#5	**3**	**Time of Concentration:**					**0.996**
#5	4	5. Nearly bare and untilled, and alluvial valley fans	2.78	32.00	1,152.00	1.660	0.192
		8. Large gullies, diversions, and low flowing streams	0.99	182.00	18,415.00	2.980	1.716
#5	**4**	**Time of Concentration:**					**1.908**
#5	5	5. Nearly bare and untilled, and alluvial valley fans	2.52	23.00	911.00	1.580	0.160
		8. Large gullies, diversions, and low flowing streams	1.07	256.00	23,965.00	3.100	2.147
#5	**5**	**Time of Concentration:**					**2.307**
#5	6	5. Nearly bare and untilled, and alluvial valley fans	6.36	25.00	393.00	2.520	0.043
		8. Large gullies, diversions, and low flowing streams	2.39	198.00	8,272.00	4.640	0.495
#5	**6**	**Time of Concentration:**					**0.538**
#5	7	5. Nearly bare and untilled, and alluvial valley fans	9.66	28.00	290.00	3.100	0.025
		8. Large gullies, diversions, and low flowing streams	2.12	179.00	8,427.00	4.370	0.535
#5	**7**	**Time of Concentration:**					**0.560**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	31.83	120.00	377.00	5.640	0.018
		8. Large gullies, diversions, and low flowing streams	1.38	198.00	14,361.00	3.520	1.133
#6	**1**	**Time of Concentration:**					**1.151**
#6	2	5. Nearly bare and untilled, and alluvial valley fans	4.25	40.00	941.00	2.060	0.126
		8. Large gullies, diversions, and low flowing streams	0.96	176.00	18,407.00	2.930	1.745
#6	**2**	**Time of Concentration:**					**1.871**
#6	3	5. Nearly bare and untilled, and alluvial valley fans	4.35	25.00	575.00	2.080	0.076
		8. Large gullies, diversions, and low flowing streams	1.57	224.00	14,223.00	3.760	1.050
#6	**3**	**Time of Concentration:**					**1.126**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.88	378.00	20,112.80	4.110	1.359
#1	**1**	**Muskingum K:**					**1.359**
#2	1	8. Large gullies, diversions, and low flowing streams	1.44	228.00	15,800.00	3.600	1.219
#2	**1**	**Muskingum K:**					**1.219**
#2	2	8. Large gullies, diversions, and low flowing streams	1.19	202.00	16,912.00	3.270	1.436
#2	**2**	**Muskingum K:**					**1.436**
#2	3	8. Large gullies, diversions, and low flowing streams	1.10	160.00	14,568.00	3.140	1.288
#2	**3**	**Muskingum K:**					**1.288**
#2	4	8. Large gullies, diversions, and low flowing streams	1.09	104.00	9,576.00	3.120	0.852
#2	**4**	**Muskingum K:**					**0.852**
#2	5	8. Large gullies, diversions, and low flowing streams	0.93	44.00	4,715.00	2.890	0.453
#2	**5**	**Muskingum K:**					**0.453**
#3	1	8. Large gullies, diversions, and low flowing streams	1.75	294.00	16,845.00	3.960	1.181
#3	**1**	**Muskingum K:**					**1.181**
#3	2	8. Large gullies, diversions, and low flowing streams	1.79	154.00	8,609.00	4.010	0.596
#3	**2**	**Muskingum K:**					**0.596**
#3	3	8. Large gullies, diversions, and low flowing streams	1.93	92.00	4,778.00	4.160	0.319
#3	**3**	**Muskingum K:**					**0.319**
#4	1	8. Large gullies, diversions, and low flowing streams	1.01	186.00	18,477.00	3.000	1.710
#4	**1**	**Muskingum K:**					**1.710**
#4	2	8. Large gullies, diversions, and low flowing streams	0.98	150.00	15,281.00	2.970	1.429
#4	**2**	**Muskingum K:**					**1.429**
#4	3	8. Large gullies, diversions, and low flowing streams	0.98	104.00	10,645.00	2.960	0.998
#4	**3**	**Muskingum K:**					**0.998**
#5	1	8. Large gullies, diversions, and low flowing streams	0.64	195.00	30,309.00	2.400	3.507
#5	**1**	**Muskingum K:**					**3.507**
#5	2	8. Large gullies, diversions, and low flowing streams	0.60	113.00	18,717.00	2.330	2.231
#5	**2**	**Muskingum K:**					**2.231**
#5	3	8. Large gullies, diversions, and low flowing streams	0.63	85.00	13,541.00	2.370	1.587
#5	**3**	**Muskingum K:**					**1.587**
#5	4	8. Large gullies, diversions, and low flowing streams	0.63	67.00	10,710.00	2.370	1.255
#5	**4**	**Muskingum K:**					**1.255**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	5	8. Large gullies, diversions, and low flowing streams	0.59	53.00	8,978.00	2.300	1.084
#5	**5**	**Muskingum K:**					**1.084**
#5	6	8. Large gullies, diversions, and low flowing streams	0.74	41.00	5,528.00	2.580	0.595
#5	**6**	**Muskingum K:**					**0.595**
#6	1	8. Large gullies, diversions, and low flowing streams	0.94	186.00	19,797.00	2.900	1.896
#6	**1**	**Muskingum K:**					**1.896**
#6	2	8. Large gullies, diversions, and low flowing streams	0.58	8.00	1,372.00	2.290	0.166
#6	**2**	**Muskingum K:**					**0.166**

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Attachment 26.A-D.2.1
PINABETE DIVERSION and EASTERN DIVERSION
10-Yr 6-Hr Event

Operations - Includes 'U' Storage Area

@ Sta: 118+00, Pinabete Diversion and No Name Impoundment

with Detailed Stormwater Designs

CBEGEJ

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General Information

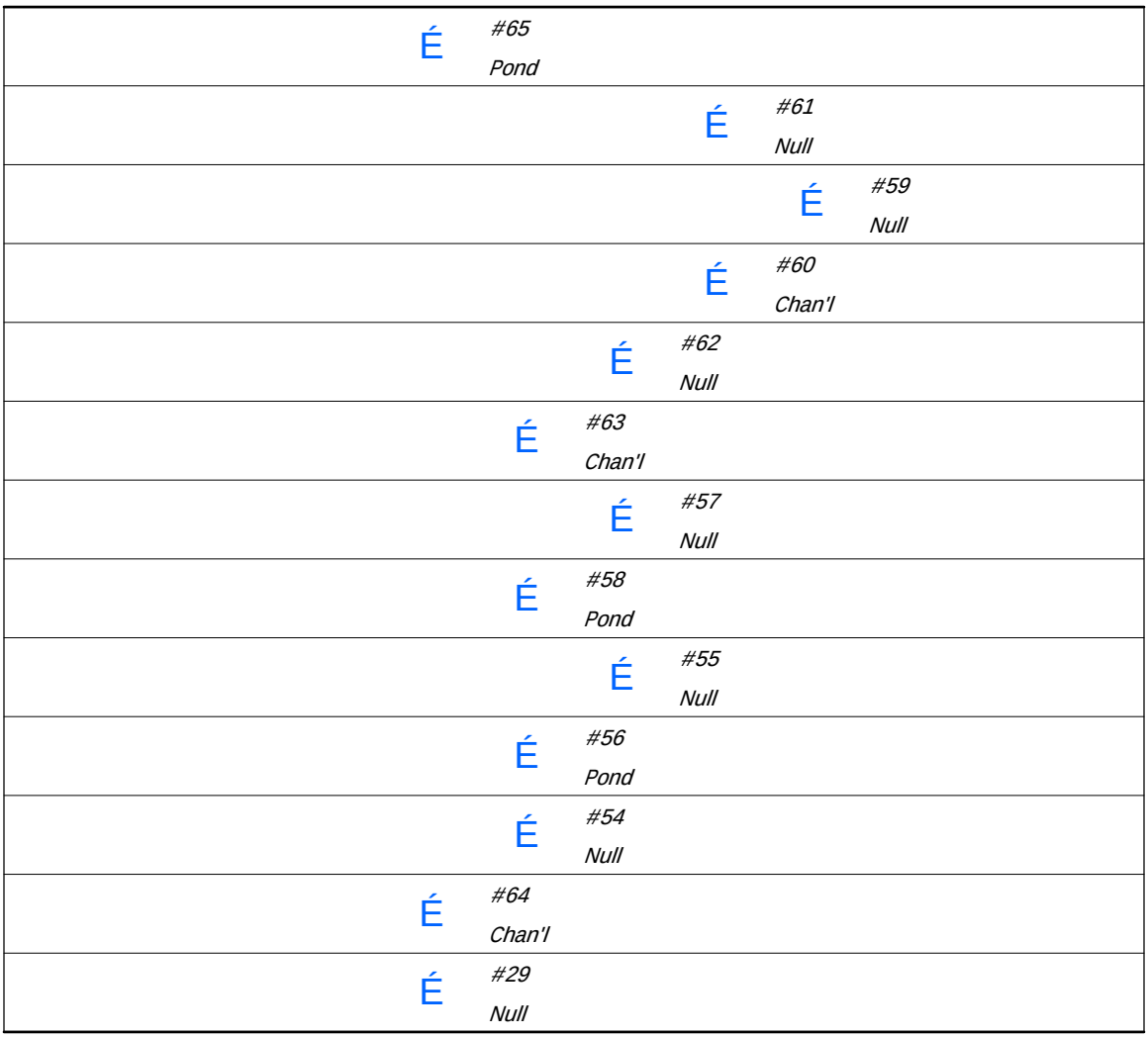
Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	10 yr - 6 hr
Rainfall Depth:	1.280 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	1.674	0.331	
Null	#2	==>	#5	4.188	0.295	
Null	#3	==>	#4	1.961	0.319	
Null	#4	==>	#5	3.103	0.304	
Null	#5	==>	#6	1.300	0.273	
Null	#6	==>	#11	0.000	0.000	EAST LEASE BNDY
Pond	#11	==>	#17	0.124	0.220	Sta:118+00 - U Shaped Impoundment
Channel	#17	==>	#27	2.321	0.220	Pinabete Diversion
Channel	#18	==>	#19	0.074	0.377	Upper East Diversion
Channel	#19	==>	#11	0.576	0.245	Lower E Diversion
Null	#20	==>	#21	0.656	0.345	NN S02 & NN S01
Null	#21	==>	#26	0.000	0.000	NNS03 (NN Imp),04,05
Null	#22	==>	#23	0.096	0.358	NN SO4 (SWS07)
Null	#23	==>	#24	0.681	0.307	NN S05 (SWS08)
Null	#24	==>	#25	1.027	0.307	NN S06 (SWS09,10,11,12,13,14)
Null	#25	==>	End	0.000	0.000	NN S07 (SWS15,16,17,18,19)
Pond	#26	==>	#28	0.063	0.380	Oultet of NN S03 Impoundment Area
Null	#27	==>	#22	0.250	0.320	End of P Diversion, NNSWS06C,S7SW1
Null	#28	==>	#27	0.241	0.246	NNSWS06A (Drop Structure)
Null	#29	==>	#27	0.205	0.246	NNSWS06B (Drop Structure)
Null	#30	==>	#31	0.000	0.000	WS5-1
Channel	#31	==>	#32	0.000	0.000	DD5-1
Channel	#32	==>	#11	0.000	0.000	Ramp Ditch 5
Null	#33	==>	#34	0.000	0.000	MS4-1 & WS4-1
Pond	#34	==>	#35	0.012	0.335	CB4-1
Channel	#35	==>	#36	0.005	0.357	DD4-1
Culvert	#36	==>	#37	0.000	0.000	CP102
Channel	#37	==>	#11	0.000	0.000	DD4-2 Ramp Ditch 4
Null	#38	==>	#39	0.000	0.000	WS3-1
Channel	#39	==>	#42	0.025	0.306	DD3-1
Null	#40	==>	#41	0.000	0.000	MS3-1
Pond	#41	==>	#42	0.000	0.000	CB3-1
Channel	#42	==>	#46	0.026	0.412	DD3-2
Null	#43	==>	#44	0.000	0.000	TDS8
Pond	#44	==>	#45	0.043	0.318	CB3-2
Channel	#45	==>	#46	0.026	0.412	DD3-3
Channel	#46	==>	#17	0.000	0.000	DD3-4 Ramp Ditch 3
Channel	#47	==>	#53	0.000	0.000	WS2-1 & DD2-1
Pond	#48	==>	#49	0.679	0.173	TDS6 & CB2-3
Channel	#49	==>	#50	0.000	0.000	MS2-1 & Ditch

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#50	==>	#53	0.052	0.406	MS2-1 Berm and Spillway (CB2-1)
Pond	#51	==>	#52	0.067	0.210	TDS7TDS & Berm (CB2-2)
Culvert	#52	==>	#53	0.000	0.000	CP101 & Material Stockpile 2
Channel	#53	==>	#17	0.000	0.000	Ramp Ditch-2
Null	#54	==>	#64	0.026	0.412	WS1-1
Null	#55	==>	#56	0.000	0.000	MS1-1
Pond	#56	==>	#64	0.026	0.412	CB1-1
Null	#57	==>	#58	0.000	0.000	TDS5
Pond	#58	==>	#64	0.026	0.412	CB1-2
Null	#59	==>	#60	0.000	0.000	WS1-2
Channel	#60	==>	#62	0.025	0.306	DD1-1
Null	#61	==>	#62	0.000	0.000	WS1-3
Null	#62	==>	#63	0.088	0.312	
Channel	#63	==>	#64	0.026	0.412	DD1-2
Channel	#64	==>	#27	0.663	0.201	Ramp Ditch 1
Pond	#65	==>	#27	0.000	0.000	MS1-2 & Pond 1-1




#20
Null
#21
Null
#26
Pond
#28
Null
#51
Pond
#52
Culvert
#48
Pond
#49
Chan'l
#50
Pond
#47
Chan'l
#53
Chan'l
#43
Null
#44
Pond
#45
Chan'l
#40
Null
#41
Pond
#38
Null
#39
Chan'l
#42
Chan'l
#46
Chan'l
#33
Null
#34
Pond

| | | |

Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.24	250.00	20,136.00	3.34	1.674
#1	**Muskingum K:**					**1.674**
#2	8. Large gullies, diversions, and low flowing streams	0.67	245.00	36,792.31	2.44	4.188
#2	**Muskingum K:**					**4.188**
#3	8. Large gullies, diversions, and low flowing streams	0.99	210.00	21,118.00	2.99	1.961
#3	**Muskingum K:**					**1.961**
#4	8. Large gullies, diversions, and low flowing streams	0.77	227.00	29,388.00	2.63	3.103
#4	**Muskingum K:**					**3.103**
#5	8. Large gullies, diversions, and low flowing streams	0.47	45.00	9,601.00	2.05	1.300
#5	**Muskingum K:**					**1.300**
#11	8. Large gullies, diversions, and low flowing streams	0.20	1.20	600.00	1.34	0.124
#11	**Muskingum K:**					**0.124**
#17	8. Large gullies, diversions, and low flowing streams	0.20	22.40	11,199.99	1.34	2.321
#17	**Muskingum K:**					**2.321**
#18	8. Large gullies, diversions, and low flowing streams	3.00	42.00	1,400.00	5.19	0.074
#18	**Muskingum K:**					**0.074**
#19	8. Large gullies, diversions, and low flowing streams	0.30	10.00	3,384.00	1.63	0.576
#19	**Muskingum K:**					**0.576**
#26	8. Large gullies, diversions, and low flowing streams	3.23	40.00	1,239.00	5.39	0.063
#26	**Muskingum K:**					**0.063**
#27	8. Large gullies, diversions, and low flowing streams	1.02	28.00	2,736.00	3.03	0.250
#27	**Muskingum K:**					**0.250**
#28	8. Large gullies, diversions, and low flowing streams	0.30	4.26	1,423.00	1.64	0.241
#28	**Muskingum K:**					**0.241**
#29	8. Large gullies, diversions, and low flowing streams	0.30	3.64	1,216.00	1.64	0.205
#29	**Muskingum K:**					**0.205**
#34	8. Large gullies, diversions, and low flowing streams	1.33	1.99	150.00	3.45	0.012
#34	**Muskingum K:**					**0.012**
#35	8. Large gullies, diversions, and low flowing streams	2.00	1.58	79.50	4.24	0.005
#35	**Muskingum K:**					**0.005**
#39	8. Large gullies, diversions, and low flowing streams	0.80	2.00	250.00	2.68	0.025

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#39	**Muskingum K:**					**0.025**
#42	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#42	**Muskingum K:**					**0.026**
#44	8. Large gullies, diversions, and low flowing streams	0.98	4.50	460.00	2.96	0.043
#44	**Muskingum K:**					**0.043**
#45	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#45	**Muskingum K:**					**0.026**
#48	8. Large gullies, diversions, and low flowing streams	0.09	1.98	2,202.63	0.90	0.679
#48	**Muskingum K:**					**0.679**
#50	8. Large gullies, diversions, and low flowing streams	6.00	82.50	1,375.00	7.34	0.052
#50	**Muskingum K:**					**0.052**
#51	8. Large gullies, diversions, and low flowing streams	0.17	0.51	300.12	1.23	0.067
#51	**Muskingum K:**					**0.067**
#54	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#54	**Muskingum K:**					**0.026**
#56	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#56	**Muskingum K:**					**0.026**
#58	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#58	**Muskingum K:**					**0.026**
#60	8. Large gullies, diversions, and low flowing streams	0.80	2.00	249.99	2.68	0.025
#60	**Muskingum K:**					**0.025**
#62	8. Large gullies, diversions, and low flowing streams	0.89	8.01	900.00	2.83	0.088
#62	**Muskingum K:**					**0.088**
#63	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#63	**Muskingum K:**					**0.026**
#64	8. Large gullies, diversions, and low flowing streams	0.15	4.00	2,725.00	1.14	0.663
#64	**Muskingum K:**					**0.663**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#65	In	22.110	22.110	14.50	0.69
	Out			0.00	0.00
#61		34.787	34.787	19.30	0.85
#59		41.030	41.030	17.36	0.98
#60		0.000	41.030	17.36	0.98
#62		0.000	75.817	34.68	1.83
#63		0.000	75.817	33.30	1.83
#57		4.740	4.740	3.23	0.09
#58	In	0.000	4.740	3.23	0.09
	Out			0.00	0.00
#55		4.870	4.870	5.73	0.19
#56	In	0.000	4.870	5.73	0.19
	Out			0.00	0.00
#54		42.850	42.850	22.43	1.03
#64		0.000	128.277	51.53	2.86
#29		286.550	286.550	136.29	6.90
#20		1,855.800	1,855.800	184.80	34.40
#21		2,370.300	4,226.100	431.15	100.44
#26	In	13.260	4,239.359	431.68	101.19
	Out			384.96	88.38
#28		67.100	4,306.459	386.25	89.98
#51	In	4.820	4.820	3.28	0.09
	Out			0.00	0.00
#52		0.200	5.020	0.24	0.01
#48	In	8.810	8.810	2.32	0.13
	Out			0.00	0.00
#49		37.570	46.380	13.35	1.17
#50	In	0.000	46.380	13.35	1.17
	Out			0.00	0.00
#47		29.270	29.270	11.82	0.51
#53		0.000	80.670	11.85	0.52
#43		6.207	6.207	2.16	0.09
#44	In	0.000	6.207	2.16	0.09
	Out			0.00	0.00
#45		0.000	6.207	0.00	0.00
#40		12.150	12.150	6.37	0.38
#41	In	0.000	12.150	6.37	0.38
	Out			0.00	0.00
#38		66.380	66.380	20.57	1.14

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#39		0.000	66.380	20.57	1.14
#42		0.000	78.530	20.57	1.14
#46		0.000	84.737	20.57	1.14
#33		14.130	14.130	8.09	0.44
#34	In	0.000	14.130	8.09	0.44
	Out			0.00	0.00
#35		0.000	14.130	0.00	0.00
#36		0.000	14.130	0.00	0.00
#37		0.000	14.130	0.00	0.00
#30		282.150	282.150	42.61	4.81
#31		0.000	282.150	42.61	4.81
#32		0.000	282.150	42.61	4.81
#18		1,500.640	1,500.640	49.46	9.64
#19		418.020	1,918.660	96.11	16.75
#3		3,978.700	3,978.700	247.93	49.23
#4		3,216.100	7,194.800	369.85	107.27
#1		8,477.899	8,477.899	580.46	139.16
#2		3,838.900	12,316.800	770.34	255.55
#5		5,494.300	25,005.900	1,125.36	532.11
#6		3,036.900	28,042.800	1,116.62	612.70
#11	In	53.960	30,311.700	1,117.70	636.81
	Out			574.08	636.81
#17		0.000	30,477.110	573.95	638.46
#27		43.270	35,263.770	573.83	739.24
#22		519.990	35,783.760	573.72	754.58
#23		233.290	36,017.050	573.65	761.15
#24		1,164.130	37,181.180	573.31	792.37
#25		648.980	37,830.160	572.80	808.47

Structure Detail:

Structure #65 (Pond)

MS1-2 & Pond 1-1

Pond Inputs:

Initial Pool Elev:	5,442.10 ft
Initial Pool:	0.03 ac-ft

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
40.00	5,451.80

Pond Results:

Peak Elevation:	5,444.25 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,442.00	0.260	0.000	0.000		
5,442.10	0.265	0.026	0.000		
5,442.50	0.285	0.136	0.000		
5,443.00	0.311	0.285	0.000		
5,443.50	0.339	0.448	0.000		
5,444.00	0.367	0.624	0.000		
5,444.25	0.382	0.718	0.000	0.00	Peak Stage
5,444.50	0.397	0.815	0.000		
5,445.00	0.427	1.021	0.000		
5,445.50	0.459	1.242	0.000		
5,446.00	0.492	1.480	0.000		
5,446.50	0.526	1.734	0.000		
5,447.00	0.562	2.006	0.000		
5,447.50	0.598	2.296	0.000		
5,448.00	0.636	2.605	0.000		
5,448.50	0.675	2.933	0.000		
5,449.00	0.715	3.280	0.000		
5,449.50	0.756	3.648	0.000		
5,450.00	0.798	4.036	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,450.50	0.841	4.446	0.000		
5,451.00	0.886	4.878	0.000		
5,451.50	0.931	5.332	0.000		
5,451.80	0.959	5.615	0.000		Spillway #1
5,452.00	0.978	5.809	11.061		

Detailed Discharge Table

Elevation (ft)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,442.00	0.000	0.000
5,442.10	0.000	0.000
5,442.50	0.000	0.000
5,443.00	0.000	0.000
5,443.50	0.000	0.000
5,444.00	0.000	0.000
5,444.50	0.000	0.000
5,445.00	0.000	0.000
5,445.50	0.000	0.000
5,446.00	0.000	0.000
5,446.50	0.000	0.000
5,447.00	0.000	0.000
5,447.50	0.000	0.000
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,451.80	0.000	0.000
5,452.00	11.061	11.061

Structure #61 (Null)

WS1-3

Structure #59 (Null)

WS1-2

Structure #60 (Erodible Channel)

DD1-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	17.36 cfs	
Depth:	1.12 ft	2.12 ft
Top Width:	6.72 ft	12.72 ft
Velocity:	4.61 fps	
X-Section Area:	3.77 sq ft	
Hydraulic Radius:	0.532 ft	
Froude Number:	1.09	

Structure #62 (Null)

Structure #63 (Erodible Channel)

DD1-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.2	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	33.30 cfs	
Depth:	0.66 ft	1.66 ft
Top Width:	14.63 ft	18.63 ft
Velocity:	3.81 fps	
X-Section Area:	8.75 sq ft	
Hydraulic Radius:	0.585 ft	
Froude Number:	0.87	

Structure #57 (Null)

TDS5

Structure #58 (Pond)

CB1-2

Pond Inputs:

Initial Pool Elev:	5,450.50 ft
Initial Pool:	0.24 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,451.01 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,449.00	0.150	0.000	0.000		
5,449.50	0.156	0.076	0.000		
5,450.00	0.162	0.156	0.000		
5,450.50	0.168	0.238	0.000		
5,451.00	0.174	0.324	0.000		
5,451.01	0.174	0.325	0.000	0.00	Peak Stage
5,451.50	0.180	0.413	0.000		Spillway #1
5,452.00	0.187	0.504	3.871		
5,452.50	0.193	0.599	51.179		
5,453.00	0.200	0.698	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #55 (Null)

MS1-1

Structure #56 (Pond)

CB1-1

Pond Inputs:

Initial Pool Elev:	5,449.70 ft
Initial Pool:	0.20 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,450.98 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,448.00	0.100	0.000	0.000		
5,448.50	0.108	0.052	0.000		
5,449.00	0.117	0.108	0.000		
5,449.50	0.131	0.170	0.000		
5,449.70	0.137	0.197	0.000		
5,449.75	0.139	0.204	0.000		
5,450.00	0.146	0.240	0.000		
5,450.25	0.148	0.277	0.000		
5,450.50	0.151	0.314	0.000		
5,450.98	0.156	0.388	0.000	0.00	Peak Stage

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,451.00	0.156	0.391	0.000		Spillway #1
5,451.50	0.166	0.471	3.871		
5,452.00	0.177	0.557	51.179		
5,452.50	0.188	0.648	105.737		
5,453.00	0.200	0.745	174.956		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,449.70	0.000	0.000
5,449.75	0.000	0.000
5,450.00	0.000	0.000
5,450.25	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	3.871	3.871
5,452.00	51.179	51.179
5,452.50	105.737	105.737
5,453.00	174.956	174.956

Structure #54 (Null)

WS1-1

Structure #64 (Riprap Channel)

Ramp Ditch 1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	51.53 cfs	
Depth:	0.45 ft	1.45 ft
Top Width:	13.78 ft	17.78 ft
Velocity*:		
X-Section Area:	5.75 sq ft	
Hydraulic Radius:	0.411 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #29 (Null)

NNSWS06B (Drop Structure)

Structure #20 (Null)

NN S02 & NN S01

Structure #21 (Null)

NNS03 (NN Imp),04,05

Structure #26 (Pond)

Oultet of NN S03 Impoundment Area

Pond Inputs:

Initial Pool Elev:	5,441.01 ft
Initial Pool:	0.00 ac-ft

Pond Results:

Peak Elevation:	5,448.15 ft
Dewater Time:	0.78 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,441.00	0.000	0.000	0.000	
5,441.01	0.011	0.000	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,442.00	1.075	0.394	0.001		
5,443.00	2.094	1.951	0.001		
5,444.00	2.823	4.400	0.001		
5,445.00	4.127	7.855	0.001		
5,446.00	5.827	12.807	0.001		
5,447.00	7.996	19.690	55.000	15.20	
5,448.00	10.478	28.899	300.000	2.70	
5,448.15	11.183	30.573	384.956	0.75	Peak Stage
5,448.48	12.103	34.314	574.837		
5,449.00	13.565	40.984	872.600		
5,450.00	16.428	55.958	1,000.000		

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,441.00	0.000	0.000
5,441.01	0.000	0.000
5,442.00	0.001	0.001
5,443.00	0.001	0.001
5,444.00	0.001	0.001
5,445.00	0.001	0.001
5,446.00	0.001	0.001
5,447.00	55.000	55.000
5,448.00	300.000	300.000
5,448.48	574.837	574.837
5,449.00	872.600	872.600
5,450.00	1,000.000	1,000.000

Structure #28 (Null)

NNSWS06A (Drop Structure)

Structure #51 (Pond)

TDS7TDS & Berm (CB2-2)

Pond Inputs:

Initial Pool Elev:	5,474.20 ft
Initial Pool:	0.01 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,477.00	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,475.11 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,474.00	0.057	0.000	0.000		
5,474.01	0.058	0.001	0.000		
5,474.20	0.068	0.013	0.000		
5,474.50	0.086	0.036	0.000		
5,475.00	0.118	0.086	0.000		
5,475.11	0.128	0.101	0.000	0.00	Peak Stage
5,475.50	0.156	0.155	0.000		
5,476.00	0.200	0.243	0.000		
5,476.50	0.243	0.354	0.000		
5,477.00	0.291	0.487	0.000		Spillway #1
5,477.50	0.343	0.646	2.913		
5,478.00	0.400	0.832	39.083		
5,478.50	0.446	1.043	81.546		
5,479.00	0.495	1.278	136.186		
5,479.50	0.546	1.538	202.723		
5,480.00	0.600	1.825	281.166		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,474.00	0.000	0.000
5,474.01	0.000	0.000
5,474.20	0.000	0.000
5,474.50	0.000	0.000
5,475.00	0.000	0.000
5,475.50	0.000	0.000
5,476.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.50	0.000	0.000
5,477.00	0.000	0.000
5,477.50	2.913	2.913
5,478.00	39.083	39.083
5,478.50	81.546	81.546
5,479.00	136.186	136.186
5,479.50	202.723	202.723
5,480.00	281.166	281.166

Structure #52 (Culvert)

CP101 & Material Stockpile 2

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.00	0.0240	1.00	0.50	0.90

Culvert Results:

Design Discharge = 0.24 cfs

Minimum pipe diameter: 1 - 6 inch pipe(s) required

Structure #48 (Pond)

TDS6 & CB2-3

Pond Inputs:

Initial Pool Elev:	5,484.40 ft
Initial Pool:	0.38 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,486.00	100.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,484.90 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,482.00	0.100	0.000	0.000		
5,482.50	0.122	0.055	0.000		
5,483.00	0.146	0.122	0.000		
5,483.50	0.172	0.202	0.000		
5,484.00	0.200	0.295	0.000		
5,484.40	0.235	0.382	0.000		
5,484.50	0.244	0.405	0.000		
5,484.70	0.263	0.456	0.000		
5,484.75	0.267	0.469	0.000		
5,484.90	0.281	0.511	0.000	0.00	Peak Stage
5,485.00	0.291	0.539	0.000		
5,485.50	0.343	0.698	0.000		
5,486.00	0.400	0.883	0.000		Spillway #1
5,486.50	0.446	1.095	11.938		
5,487.00	0.495	1.330	23.876		
5,487.50	0.546	1.590	54.567		
5,488.00	0.600	1.877	96.681		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,482.00	0.000	0.000
5,482.50	0.000	0.000
5,483.00	0.000	0.000
5,483.50	0.000	0.000
5,484.00	0.000	0.000
5,484.40	0.000	0.000
5,484.50	0.000	0.000
5,484.70	0.000	0.000
5,484.75	0.000	0.000
5,485.00	0.000	0.000
5,485.50	0.000	0.000
5,486.00	0.000	0.000
5,486.50	11.938	11.938
5,487.00	23.876	23.876
5,487.50	54.567	54.567
5,488.00	96.681	96.681

Structure #49 (Erodible Channel)

MS2-1 & Ditch

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	0.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	13.35 cfs	
Depth:	0.42 ft	1.42 ft
Top Width:	13.67 ft	17.67 ft
Velocity:	2.50 fps	
X-Section Area:	5.35 sq ft	
Hydraulic Radius:	0.386 ft	
Froude Number:	0.70	

Structure #50 (Pond)

MS2-1 Berm and Spillway (CB2-1)

Pond Inputs:

Initial Pool Elev:	5,480.00 ft
Initial Pool:	1.89 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,482.00	15.00	2.00:1	2.00:1	25.00

Pond Results:

Peak Elevation:	5,481.16 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,476.00	0.230	0.000	0.000	
5,476.50	0.268	0.124	0.000	
5,477.00	0.309	0.269	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,477.50	0.353	0.434	0.000		
5,478.00	0.400	0.622	0.000		
5,478.50	0.506	0.848	0.000		
5,479.00	0.625	1.130	0.000		
5,479.50	0.758	1.476	0.000		
5,479.75	0.828	1.674	0.000		
5,480.00	0.900	1.890	0.000		
5,480.20	0.938	2.074	0.000		
5,480.50	0.994	2.363	0.000		
5,480.82	1.056	2.691	0.000		
5,481.00	1.091	2.884	0.000		
5,481.16	1.124	3.062	0.000	0.00	Peak Stage
5,481.50	1.193	3.455	0.000		
5,482.00	1.300	4.078	0.000		Spillway #1
5,482.50	1.306	4.730	4.829		
5,483.00	1.312	5.384	63.277		
5,483.50	1.318	6.042	129.940		
5,484.00	1.325	6.703	213.757		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.00	0.000	0.000
5,476.50	0.000	0.000
5,477.00	0.000	0.000
5,477.50	0.000	0.000
5,478.00	0.000	0.000
5,478.50	0.000	0.000
5,479.00	0.000	0.000
5,479.50	0.000	0.000
5,479.75	0.000	0.000
5,480.00	0.000	0.000
5,480.20	0.000	0.000
5,480.50	0.000	0.000
5,480.82	0.000	0.000
5,481.00	0.000	0.000
5,481.50	0.000	0.000
5,482.00	0.000	0.000
5,482.50	4.829	4.829

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,483.00	63.277	63.277
5,483.50	129.940	129.940
5,484.00	213.757	213.757

Structure #47 (Erodible Channel)

WS2-1 & DD2-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	11.82 cfs	
Depth:	0.31 ft	1.31 ft
Top Width:	13.24 ft	17.24 ft
Velocity:	3.02 fps	
X-Section Area:	3.92 sq ft	
Hydraulic Radius:	0.293 ft	
Froude Number:	0.98	

Structure #53 (Riprap Channel)

Ramp Ditch-2

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
6.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	11.85 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	0.21 ft	1.21 ft
Top Width:	6.85 ft	10.85 ft
Velocity*:		
X-Section Area:	1.36 sq ft	
Hydraulic Radius:	0.196 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #43 (Null)

TDS8

Structure #44 (Pond)

CB3-2

Pond Inputs:

Initial Pool Elev:	5,468.70 ft
Initial Pool:	0.18 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,470.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,469.06 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,468.00	0.250	0.000	0.000	
5,468.50	0.256	0.126	0.000	
5,468.70	0.258	0.178	0.000	
5,468.80	0.260	0.204	0.000	
5,469.00	0.262	0.256	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,469.06	0.263	0.271	0.000	0.00	Peak Stage
5,469.20	0.264	0.309	0.000		
5,469.31	0.266	0.338	0.000		
5,469.50	0.268	0.388	0.000		
5,470.00	0.274	0.524	0.000		Spillway #1
5,470.50	0.280	0.663	3.871		
5,471.00	0.287	0.804	51.179		
5,471.50	0.293	0.950	105.737		
5,472.00	0.300	1.098	174.956		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,468.00	0.000	0.000
5,468.50	0.000	0.000
5,468.70	0.000	0.000
5,468.80	0.000	0.000
5,469.00	0.000	0.000
5,469.20	0.000	0.000
5,469.31	0.000	0.000
5,469.50	0.000	0.000
5,470.00	0.000	0.000
5,470.50	3.871	3.871
5,471.00	51.179	51.179
5,471.50	105.737	105.737
5,472.00	174.956	174.956

Structure #45 (Erodible Channel)

DD3-3

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.00 cfs	
Depth:	0.01 ft	1.01 ft
Top Width:	0.06 ft	6.06 ft
Velocity:	0.20 fps	
X-Section Area:	0.00 sq ft	
Hydraulic Radius:	0.005 ft	
Froude Number:	0.49	

Structure #40 (Null)

MS3-1

Structure #41 (Pond)

CB3-1

Pond Inputs:

Initial Pool Elev:	5,464.10 ft
Initial Pool:	0.05 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,464.92 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,464.00	0.450	0.000	0.000		
5,464.10	0.452	0.045	0.000		
5,464.20	0.455	0.091	0.000		
5,464.50	0.462	0.228	0.000		
5,464.92	0.472	0.426	0.000	0.00	Peak Stage
5,465.00	0.474	0.462	0.000		
5,465.50	0.486	0.702	0.000		
5,465.65	0.490	0.775	0.000		
5,466.00	0.499	0.948	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,466.50	0.511	1.201	0.000		
5,466.60	0.514	1.252	0.000		Spillway #1
5,467.00	0.524	1.460	14.423		
5,467.50	0.537	1.725	32.456		
5,468.00	0.550	1.997	72.062		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,464.00	0.000	0.000
5,464.10	0.000	0.000
5,464.20	0.000	0.000
5,464.50	0.000	0.000
5,465.00	0.000	0.000
5,465.50	0.000	0.000
5,465.65	0.000	0.000
5,466.00	0.000	0.000
5,466.50	0.000	0.000
5,466.60	0.000	0.000
5,467.00	14.423	14.423
5,467.50	32.456	32.456
5,468.00	72.062	72.062

Structure #38 (Null)

WS3-1

Structure #39 (Erodible Channel)

DD3-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.4	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	20.57 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	0.47 ft	1.47 ft
Top Width:	13.89 ft	17.89 ft
Velocity:	3.36 fps	
X-Section Area:	6.11 sq ft	
Hydraulic Radius:	0.433 ft	
Froude Number:	0.89	

Structure #42 (Erodible Channel)

DD3-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	20.57 cfs	
Depth:	0.46 ft	1.46 ft
Top Width:	13.85 ft	17.85 ft
Velocity:	3.44 fps	
X-Section Area:	5.98 sq ft	
Hydraulic Radius:	0.425 ft	
Froude Number:	0.92	

Structure #46 (Riprap Channel)

DD3-4 Ramp Ditch 3

Triangular Riprap Channel Inputs:

Material: Riprap

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	20.57 cfs	
Depth:	1.25 ft	2.25 ft
Top Width:	5.02 ft	9.02 ft
Velocity:	6.54 fps	
X-Section Area:	3.15 sq ft	
Hydraulic Radius:	0.561 ft	
Froude Number:	1.46	
Manning's n:	0.0410	
Dmin:	3.00 in	
D50:	6.00 in	
Dmax:	9.00 in	

Structure #33 (Null)

MS4-1 & WS4-1

Structure #34 (Pond)

CB4-1

Pond Inputs:

Initial Pool Elev:	5,464.90 ft
Initial Pool:	0.81 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,465.99 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,462.00	0.200	0.000	0.000	
5,462.01	0.200	0.002	0.000	
5,462.50	0.225	0.106	0.000	
5,463.00	0.252	0.226	0.000	
5,463.50	0.280	0.359	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,464.00	0.310	0.506	0.000		
5,464.50	0.341	0.669	0.000		
5,464.90	0.367	0.810	0.000		
5,465.00	0.373	0.847	0.000		
5,465.50	0.407	1.042	0.000		
5,465.99	0.443	1.252	0.000	0.00	Peak Stage
5,466.00	0.443	1.255	0.000		
5,466.50	0.480	1.485	0.000		
5,466.60	0.487	1.534	0.000		Spillway #1
5,467.00	0.518	1.735	18.923		
5,467.50	0.558	2.004	42.582		
5,468.00	0.600	2.293	93.619		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,462.00	0.000	0.000
5,462.01	0.000	0.000
5,462.50	0.000	0.000
5,463.00	0.000	0.000
5,463.50	0.000	0.000
5,464.00	0.000	0.000
5,464.50	0.000	0.000
5,464.90	0.000	0.000
5,465.00	0.000	0.000
5,465.50	0.000	0.000
5,466.00	0.000	0.000
5,466.50	0.000	0.000
5,466.60	0.000	0.000
5,467.00	18.923	18.923
5,467.50	42.582	42.582
5,468.00	93.619	93.619

Structure #35 (Erodible Channel)

DD4-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	0.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.00 cfs	
Depth:	0.01 ft	1.01 ft
Top Width:	0.06 ft	6.06 ft
Velocity:	0.10 fps	
X-Section Area:	0.00 sq ft	
Hydraulic Radius:	0.005 ft	
Froude Number:	0.25	

Structure #36 (Culvert)

CP102

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.50	0.0150	2.00	1.50	0.90

Culvert Results:

Design Discharge = 0.00 cfs

Minimum pipe diameter: 1 - 2 inch pipe(s) required

Structure #37 (Riprap Channel)

DD4-2 Ramp Ditch 4

Triangular Riprap Channel Inputs:

Material: Riprap

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.00 cfs	
Depth:	0.01 ft	1.01 ft

	w/o Freeboard	w/ Freeboard
Top Width:	0.04 ft	4.04 ft
Velocity:	-10.70 fps	
X-Section Area:	0.00 sq ft	
Hydraulic Radius:	0.004 ft	
Froude Number:	-26.67	
Manning's n:	-0.0010	
Dmin:	0.50 in	
D50:	0.75 in	
Dmax:	1.50 in	

Structure #30 (Null)

WS5-1

Structure #31 (Erodible Channel)

DD5-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	42.61 cfs	
Depth:	0.80 ft	1.80 ft
Top Width:	15.20 ft	19.20 ft
Velocity:	3.91 fps	
X-Section Area:	10.89 sq ft	
Hydraulic Radius:	0.699 ft	
Froude Number:	0.81	

Structure #32 (Riprap Channel)

Ramp Ditch 5

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	42.61 cfs	
Depth:	0.56 ft	1.56 ft
Top Width:	14.23 ft	18.23 ft
Velocity:	5.82 fps	
X-Section Area:	7.33 sq ft	
Hydraulic Radius:	0.505 ft	
Froude Number:	1.43	
Manning's n:	0.0430	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #18 (Erodible Channel)

Upper East Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
14.00	2.0:1	2.0:1	0.6	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	49.46 cfs	
Depth:	1.02 ft	
Top Width:	18.07 ft	
Velocity:	3.03 fps	
X-Section Area:	16.33 sq ft	
Hydraulic Radius:	0.880 ft	
Froude Number:	0.56	

Structure #19 (Erodible Channel)

Lower E Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
14.00	2.0:1	2.0:1	0.3	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	96.11 cfs	
Depth:	1.82 ft	
Top Width:	21.29 ft	
Velocity:	2.99 fps	
X-Section Area:	32.15 sq ft	
Hydraulic Radius:	1.452 ft	
Froude Number:	0.43	

Structure #3 (Null)

Structure #4 (Null)

Structure #1 (Null)

Structure #2 (Null)

Structure #5 (Null)

Structure #6 (Null)

EAST LEASE BNDY

Structure #11 (Pond)

Sta:118+00 - U Shaped Impoundment

Pond Inputs:

Initial Pool Elev:	5,430.01 ft
Initial Pool:	0.00 ac-ft

Pond Results:

Peak Elevation:	5,444.74 ft
Dewater Time:	1.34 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,430.00	0.000	0.000	0.000		
5,430.01	0.002	0.000	0.000		
5,431.00	0.225	0.082	3.900	1.70	
5,432.00	0.822	0.575	8.230	1.00	
5,433.00	2.809	2.292	17.280	1.75	
5,434.00	6.235	6.701	31.060	2.25	
5,435.00	11.008	15.210	45.120	2.75	
5,436.00	16.934	29.075	65.530	3.05	
5,437.00	24.132	49.503	92.860	3.15	
5,438.00	29.977	76.504	129.180	2.95	
5,439.00	36.455	109.667	168.090	2.75	
5,440.00	39.413	147.592	209.680	2.45	
5,441.00	42.486	188.531	263.440	2.10	
5,442.00	43.250	231.399	329.180	1.75	
5,443.00	44.020	275.033	421.610	1.55	
5,444.00	44.637	319.361	515.750	1.40	
5,444.74	45.098	352.660	574.083	1.65	Peak Stage
5,445.00	45.259	364.309	594.490		
5,446.00	46.060	409.968	807.140		
5,447.00	46.869	456.432	1,021.210		
5,448.00	48.100	503.915	1,167.930		
5,449.00	49.346	552.637	1,720.410		
5,450.00	51.291	602.952	2,309.040		
5,451.00	53.274	655.232	2,928.330		
5,452.00	56.392	710.057	3,767.860		
5,452.50	57.976	738.649	4,223.680		
5,453.00	59.573	768.035	4,693.290		
5,454.00	65.520	830.558	5,723.400		
5,455.00	71.750	899.169	6,850.570		

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,430.00	0.000	0.000
5,430.01	0.000	0.000
5,431.00	3.900	3.900
5,432.00	8.230	8.230
5,433.00	17.280	17.280

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,434.00	31.060	31.060
5,435.00	45.120	45.120
5,436.00	65.530	65.530
5,437.00	92.860	92.860
5,438.00	129.180	129.180
5,439.00	168.090	168.090
5,440.00	209.680	209.680
5,441.00	263.440	263.440
5,442.00	329.180	329.180
5,443.00	421.610	421.610
5,444.00	515.750	515.750
5,445.00	594.490	594.490
5,446.00	807.140	807.140
5,447.00	1,021.210	1,021.210
5,448.00	1,167.930	1,167.930
5,449.00	1,720.410	1,720.410
5,450.00	2,309.040	2,309.040
5,451.00	2,928.330	2,928.330
5,452.00	3,767.860	3,767.860
5,452.50	4,223.680	4,223.680
5,453.00	4,693.290	4,693.290
5,454.00	5,723.400	5,723.400
5,455.00	6,850.570	6,850.570

Structure #17 (Erodible Channel)

Pinabete Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
45.00	2.0:1	2.0:1	0.2	0.0400		50.00		5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	573.95 cfs	
Depth:	3.31 ft	4.97 ft
Top Width:	58.25 ft	64.88 ft
Velocity:	3.36 fps	
X-Section Area:	171.03 sq ft	

	w/o Freeboard	w/ Freeboard
Hydraulic Radius:	2.859 ft	
Froude Number:	0.35	

Structure #27 (Null)

End of P Diversion, NNSWS06C,S7SW1

Structure #22 (Null)

NN SO4 (SWS07)

Structure #23 (Null)

NN S05 (SWS08)

Structure #24 (Null)

NN S06 (SWS09,10,11,12,13,14)

Structure #25 (Null)

NN S07 (SWS15,16,17,18,19)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#65	1	22.110	0.202	0.000	0.000	89.000	M	14.50	0.692
	Σ	**22.110**						**14.50**	**0.692**
#61	1	34.787	0.134	0.000	0.000	86.200	M	19.30	0.847
	Σ	**34.787**						**19.30**	**0.847**
#59	1	41.030	0.320	0.000	0.000	86.200	M	17.36	0.983
	Σ	**41.030**						**17.36**	**0.983**
#60	Σ	**41.030**						**17.36**	**0.983**
#62	Σ	**75.817**						**34.68**	**1.831**
#63	Σ	**75.817**						**33.30**	**1.831**
#57	1	4.740	0.080	0.000	0.000	81.500	M	3.23	0.087
	Σ	**4.740**						**3.23**	**0.087**
#58	Σ	**4.740**						**3.23**	**0.087**
#55	1	4.870	0.122	0.000	0.000	89.000	M	5.73	0.190
	Σ	**4.870**						**5.73**	**0.190**
#56	Σ	**4.870**						**5.73**	**0.190**
#54	1	42.850	0.194	0.000	0.000	86.200	M	22.43	1.031
	Σ	**42.850**						**22.43**	**1.031**
#64	Σ	**128.277**						**51.53**	**2.861**
#29	1	286.550	0.248	0.000	0.000	86.200	M	136.29	6.903
	Σ	**286.550**						**136.29**	**6.903**
#20	1	856.430	1.610	0.000	0.000	85.700	M	114.75	19.453
	2	999.370	1.260	0.814	0.291	81.700	M	102.85	14.942
	Σ	**1,855.800**						**184.80**	**34.395**
#21	1	925.920	1.675	0.409	0.297	88.800	M	165.33	28.342
	2	1,019.220	1.106	0.193	0.261	87.000	M	209.25	26.294
	3	425.160	0.766	0.000	0.000	87.400	M	118.64	11.408
	Σ	**4,226.100**						**431.15**	**100.440**
#26	1	13.260	0.076	0.000	0.000	93.000	M	19.72	0.748
	Σ	**4,239.359**						**431.68**	**101.188**
#28	1	67.100	0.380	0.000	0.000	86.200	M	25.95	1.602
	Σ	**4,306.459**						**386.25**	**89.980**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#51	1	4.820	0.055	0.000	0.000	81.500	M	3.28	0.088
	Σ	**4.820**						**3.28**	**0.088**
#52	1	0.200	0.004	0.000	0.000	89.000	M	0.24	0.007
	Σ	**5.020**						**0.24**	**0.007**
#48	1	8.810	0.301	0.000	0.000	81.500	M	2.32	0.129
	Σ	**8.810**						**2.32**	**0.129**
#49	1	37.570	0.681	0.000	0.000	89.000	M	13.35	1.173
	Σ	**46.380**						**13.35**	**1.173**
#50	Σ	**46.380**						**13.35**	**1.173**
#47	1	29.270	0.146	0.000	0.000	82.900	M	11.82	0.509
	Σ	**29.270**						**11.82**	**0.509**
#53	Σ	**80.670**						**11.85**	**0.516**
#43	1	6.207	0.137	0.000	0.000	81.500	M	2.16	0.093
	Σ	**6.207**						**2.16**	**0.093**
#44	Σ	**6.207**						**2.16**	**0.093**
#45	Σ	**6.207**						**0.00**	**0.000**
#40	1	12.150	0.354	0.000	0.000	89.000	M	6.37	0.381
	Σ	**12.150**						**6.37**	**0.381**
#41	Σ	**12.150**						**6.37**	**0.381**
#38	1	66.380	0.302	0.000	0.000	82.900	M	20.57	1.135
	Σ	**66.380**						**20.57**	**1.135**
#39	Σ	**66.380**						**20.57**	**1.135**
#42	Σ	**78.530**						**20.57**	**1.135**
#46	Σ	**84.737**						**20.57**	**1.135**
#33	1	14.130	0.291	0.000	0.000	89.000	M	8.09	0.442
	Σ	**14.130**						**8.09**	**0.442**
#34	Σ	**14.130**						**8.09**	**0.442**
#35	Σ	**14.130**						**0.00**	**0.000**
#36	Σ	**14.130**						**0.00**	**0.000**
#37	Σ	**14.130**						**0.00**	**0.000**
#30	1	282.150	0.909	0.000	0.000	82.900	M	42.61	4.809
	Σ	**282.150**						**42.61**	**4.809**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#31	**∑**	**282.150**						**42.61**	**4.809**
#32	**∑**	**282.150**						**42.61**	**4.809**
#18	1	1,352.640	1.370	0.000	0.000	75.000	M	49.13	8.552
	2	148.000	1.315	1.026	0.249	76.000	M	6.57	1.085
	∑	**1,500.640**						**49.46**	**9.636**
#19	1	418.020	1.293	0.000	0.000	82.900	M	48.66	7.119
	∑	**1,918.660**						**96.11**	**16.755**
#3	1	791.300	1.145	1.181	0.350	80.800	M	78.22	10.689
	2	1,079.100	0.915	0.596	0.351	80.900	M	127.23	14.750
	3	450.300	0.571	0.319	0.355	81.300	M	77.09	6.446
	4	742.600	0.625	0.000	0.000	78.500	M	82.23	7.605
	5	915.400	1.119	0.000	0.000	78.800	M	70.39	9.738
	∑	**3,978.700**						**247.93**	**49.228**
#4	1	546.400	0.726	1.710	0.319	81.700	M	83.53	8.175
	2	441.200	0.503	1.429	0.318	86.000	M	141.35	10.341
	3	889.400	0.815	0.998	0.318	82.100	M	131.85	13.902
	4	1,339.100	0.919	0.000	0.000	84.000	M	227.47	25.621
	∑	**7,194.800**						**369.85**	**107.266**
#1	1	1,242.300	1.349	1.359	0.354	80.800	M	108.51	16.777
	2	1,662.000	1.465	0.865	0.359	80.300	M	127.83	21.180
	3	1,434.000	1.573	1.257	0.357	81.100	M	115.61	20.041
	4	842.700	1.102	0.977	0.364	81.000	M	87.90	11.646
	5	676.100	1.067	1.113	0.365	81.600	M	77.83	9.998
	6	1,223.200	0.778	0.596	0.352	81.800	M	180.53	18.502
	7	743.100	0.745	0.530	0.354	83.600	M	139.81	13.639
	8	654.500	0.801	0.000	0.000	92.200	M	282.70	27.380
	∑	**8,477.899**						**580.46**	**139.163**
#2	1	609.500	0.668	1.219	0.340	85.700	M	156.51	13.865
	2	537.100	0.610	1.436	0.329	91.600	M	263.40	21.301
	3	455.000	0.546	1.288	0.324	82.000	M	87.71	7.037
	4	627.000	0.634	0.852	0.324	87.900	M	209.54	17.639
	5	653.100	0.452	0.453	0.315	91.200	M	370.37	24.976
	6	957.200	0.984	0.000	0.000	89.600	M	278.74	31.573
	∑	**12,316.800**						**770.34**	**255.553**
#5	1	763.100	0.682	3.507	0.293	84.100	M	161.84	14.756
	2	983.300	1.117	2.231	0.289	89.200	M	250.58	31.244
	3	1,022.000	0.996	1.587	0.291	92.000	M	371.69	41.995
	4	688.700	1.908	1.255	0.291	80.800	M	46.01	9.300

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
	5	754.300	2.307	1.084	0.287	86.200	M	79.78	17.997
	6	628.400	0.538	0.595	0.301	93.000	M	380.45	28.283
	7	654.500	0.560	0.000	0.000	91.500	M	335.86	25.719
	Σ	**25,005.900**						**1,125.36**	**532.113**
#6	1	901.400	1.151	1.896	0.315	81.100	M	92.19	12.600
	2	1,011.200	1.871	0.166	0.287	83.500	M	94.59	18.352
	3	1,124.300	1.126	0.000	0.000	92.800	M	402.87	49.639
	Σ	**28,042.800**						**1,116.62**	**612.704**
#11	1	53.960	0.000	0.000	0.000	91.000	M	71.78	2.538
	Σ	**30,311.700**						**1,117.70**	**636.806**
#17	Σ	**30,477.110**						**573.95**	**638.457**
#27	1	43.270	0.441	0.000	0.000	86.200	M	15.35	1.034
	Σ	**35,263.770**						**573.83**	**739.235**
#22	1	519.990	0.565	0.000	0.000	88.400	M	196.97	15.343
	Σ	**35,783.760**						**573.72**	**754.578**
#23	1	233.290	0.469	0.000	0.000	87.900	M	94.46	6.571
	Σ	**36,017.050**						**573.65**	**761.150**
#24	1	126.980	0.164	0.545	0.308	86.900	M	74.97	3.312
	2	235.630	0.327	0.427	0.341	86.700	M	103.50	5.930
	3	258.380	0.416	0.365	0.294	88.300	M	116.48	7.577
	4	180.930	0.449	0.176	0.301	86.700	M	66.80	4.539
	5	189.850	0.326	0.146	0.330	86.800	M	84.31	4.824
	6	172.360	0.753	0.000	0.000	88.300	M	53.32	5.038
	Σ	**37,181.180**						**573.31**	**792.369**
#25	1	91.450	0.220	0.854	0.310	86.800	M	48.23	2.330
	2	286.490	0.566	0.642	0.312	87.100	M	95.23	7.469
	3	75.280	0.179	0.610	0.308	86.800	M	42.95	1.937
	4	128.700	0.157	0.270	0.325	86.800	M	75.32	3.324
	5	67.060	0.333	0.000	0.000	82.000	M	17.75	1.042
	Σ	**37,830.160**						**572.80**	**808.471**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.99	22.00	736.00	1.720	0.118

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.63	66.00	10,511.22	2.370	1.231
#1	**1**	**Time of Concentration:**					**1.349**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	6.24	30.00	481.00	2.490	0.053
		8. Large gullies, diversions, and low flowing streams	3.34	406.00	12,141.00	5.480	0.615
#2	**1**	**Time of Concentration:**					**0.668**
#2	2	5. Nearly bare and untilled, and alluvial valley fans	3.16	30.00	950.00	1.770	0.149
		8. Large gullies, diversions, and low flowing streams	4.22	432.00	10,229.00	6.160	0.461
#2	**2**	**Time of Concentration:**					**0.610**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	2.65	10.00	378.00	1.620	0.064
		8. Large gullies, diversions, and low flowing streams	2.72	234.00	8,592.00	4.950	0.482
#2	**3**	**Time of Concentration:**					**0.546**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	3.07	25.00	815.00	1.750	0.129
		8. Large gullies, diversions, and low flowing streams	3.32	330.00	9,931.00	5.460	0.505
#2	**4**	**Time of Concentration:**					**0.634**
#2	5	5. Nearly bare and untilled, and alluvial valley fans	7.45	45.00	604.00	2.720	0.061
		8. Large gullies, diversions, and low flowing streams	3.78	310.00	8,210.00	5.820	0.391
#2	**5**	**Time of Concentration:**					**0.452**
#2	6	5. Nearly bare and untilled, and alluvial valley fans	9.10	80.00	879.00	3.010	0.081
		8. Large gullies, diversions, and low flowing streams	2.32	344.00	14,831.00	4.560	0.903
#2	**6**	**Time of Concentration:**					**0.984**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	1.29	15.00	1,163.00	1.130	0.285
		8. Large gullies, diversions, and low flowing streams	2.37	338.00	14,280.00	4.610	0.860
#3	**1**	**Time of Concentration:**					**1.145**
#3	2	5. Nearly bare and untilled, and alluvial valley fans	3.04	33.00	1,087.00	1.740	0.173
		8. Large gullies, diversions, and low flowing streams	2.06	238.00	11,527.00	4.310	0.742
#3	**2**	**Time of Concentration:**					**0.915**
#3	3	5. Nearly bare and untilled, and alluvial valley fans	5.02	45.00	897.00	2.230	0.111
		8. Large gullies, diversions, and low flowing streams	3.09	270.00	8,741.00	5.270	0.460
#3	**3**	**Time of Concentration:**					**0.571**
#3	4	5. Nearly bare and untilled, and alluvial valley fans	7.41	28.00	378.00	2.720	0.038

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	3.43	402.00	11,736.00	5.550	0.587
#3	**4**	**Time of Concentration:**					**0.625**
#3	5	5. Nearly bare and untilled, and alluvial valley fans	3.39	30.00	885.00	1.840	0.133
		8. Large gullies, diversions, and low flowing streams	2.58	442.00	17,121.00	4.820	0.986
#3	**5**	**Time of Concentration:**					**1.119**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	3.59	62.00	1,729.00	1.890	0.254
		8. Large gullies, diversions, and low flowing streams	2.09	154.00	7,372.00	4.330	0.472
#4	**1**	**Time of Concentration:**					**0.726**
#4	2	5. Nearly bare and untilled, and alluvial valley fans	6.83	25.00	366.00	2.610	0.038
		8. Large gullies, diversions, and low flowing streams	2.36	182.00	7,708.00	4.600	0.465
#4	**2**	**Time of Concentration:**					**0.503**
#4	3	5. Nearly bare and untilled, and alluvial valley fans	19.03	47.00	247.00	4.360	0.015
		8. Large gullies, diversions, and low flowing streams	2.13	268.00	12,586.00	4.370	0.800
#4	**3**	**Time of Concentration:**					**0.815**
#4	4	5. Nearly bare and untilled, and alluvial valley fans	14.08	50.00	355.00	3.750	0.026
		8. Large gullies, diversions, and low flowing streams	2.46	372.00	15,119.00	4.700	0.893
#4	**4**	**Time of Concentration:**					**0.919**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	12.55	65.00	518.00	3.540	0.040
		8. Large gullies, diversions, and low flowing streams	1.92	184.00	9,592.00	4.150	0.642
#5	**1**	**Time of Concentration:**					**0.682**
#5	2	5. Nearly bare and untilled, and alluvial valley fans	5.10	30.00	588.00	2.250	0.072
		8. Large gullies, diversions, and low flowing streams	1.77	266.00	15,016.00	3.990	1.045
#5	**2**	**Time of Concentration:**					**1.117**
#5	3	5. Nearly bare and untilled, and alluvial valley fans	1.90	20.00	1,050.00	1.380	0.211
		8. Large gullies, diversions, and low flowing streams	2.19	274.00	12,532.00	4.430	0.785
#5	**3**	**Time of Concentration:**					**0.996**
#5	4	5. Nearly bare and untilled, and alluvial valley fans	2.78	32.00	1,152.00	1.660	0.192
		8. Large gullies, diversions, and low flowing streams	0.99	182.00	18,415.00	2.980	1.716
#5	**4**	**Time of Concentration:**					**1.908**
#5	5	5. Nearly bare and untilled, and alluvial valley fans	2.52	23.00	911.00	1.580	0.160

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	1.07	256.00	23,965.00	3.100	2.147
#5	**5**	**Time of Concentration:**					**2.307**
#5	6	5. Nearly bare and untilled, and alluvial valley fans	6.36	25.00	393.00	2.520	0.043
		8. Large gullies, diversions, and low flowing streams	2.39	198.00	8,272.00	4.640	0.495
#5	**6**	**Time of Concentration:**					**0.538**
#5	7	5. Nearly bare and untilled, and alluvial valley fans	9.66	28.00	290.00	3.100	0.025
		8. Large gullies, diversions, and low flowing streams	2.12	179.00	8,427.00	4.370	0.535
#5	**7**	**Time of Concentration:**					**0.560**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	31.83	120.00	377.00	5.640	0.018
		8. Large gullies, diversions, and low flowing streams	1.38	198.00	14,361.00	3.520	1.133
#6	**1**	**Time of Concentration:**					**1.151**
#6	2	5. Nearly bare and untilled, and alluvial valley fans	4.25	40.00	941.00	2.060	0.126
		8. Large gullies, diversions, and low flowing streams	0.96	176.00	18,407.00	2.930	1.745
#6	**2**	**Time of Concentration:**					**1.871**
#6	3	5. Nearly bare and untilled, and alluvial valley fans	4.35	25.00	575.00	2.080	0.076
		8. Large gullies, diversions, and low flowing streams	1.57	224.00	14,223.00	3.760	1.050
#6	**3**	**Time of Concentration:**					**1.126**
#26	1	8. Large gullies, diversions, and low flowing streams	2.35	30.00	1,275.00	4.600	0.076
#26	**1**	**Time of Concentration:**					**0.076**
#27	1	5. Nearly bare and untilled, and alluvial valley fans	2.60	15.60	600.00	1.610	0.103
		8. Large gullies, diversions, and low flowing streams	0.92	32.00	3,493.83	2.870	0.338
#27	**1**	**Time of Concentration:**					**0.441**
#28	1	8. Large gullies, diversions, and low flowing streams	2.92	80.00	2,740.30	5.120	0.148
		8. Large gullies, diversions, and low flowing streams	2.60	105.00	4,042.56	4.830	0.232
#28	**1**	**Time of Concentration:**					**0.380**
#29	1	8. Large gullies, diversions, and low flowing streams	3.69	120.00	3,255.51	5.750	0.157
		8. Large gullies, diversions, and low flowing streams	0.87	8.00	921.20	2.790	0.091
#29	**1**	**Time of Concentration:**					**0.248**
#30	1	5. Nearly bare and untilled, and alluvial valley fans	2.56	42.03	1,642.00	1.590	0.286
		5. Nearly bare and untilled, and alluvial valley fans	1.42	17.99	1,267.00	1.190	0.295

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.94	18.00	1,915.00	2.900	0.183
		8. Large gullies, diversions, and low flowing streams	0.25	1.95	784.00	1.500	0.145
#30	**1**	**Time of Concentration:**					**0.909**
#33	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	9.39	469.50	1.410	0.092
		8. Large gullies, diversions, and low flowing streams	0.50	7.50	1,500.00	2.120	0.196
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#33	**1**	**Time of Concentration:**					**0.291**
#38	1	5. Nearly bare and untilled, and alluvial valley fans	2.50	2.00	80.00	1.580	0.014
		7. Paved area and small upland gullies	4.80	16.03	334.00	4.410	0.021
		7. Paved area and small upland gullies	1.80	27.75	1,542.00	2.700	0.158
		8. Large gullies, diversions, and low flowing streams	1.42	19.99	1,408.00	3.570	0.109
#38	**1**	**Time of Concentration:**					**0.302**
#40	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	13.29	664.53	1.410	0.130
		8. Large gullies, diversions, and low flowing streams	0.30	3.93	1,310.00	1.640	0.221
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#40	**1**	**Time of Concentration:**					**0.354**
#43	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		8. Large gullies, diversions, and low flowing streams	1.50	15.00	1,000.00	3.670	0.075
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#43	**1**	**Time of Concentration:**					**0.137**
#47	1	5. Nearly bare and untilled, and alluvial valley fans	2.33	6.99	300.00	1.520	0.054
		8. Large gullies, diversions, and low flowing streams	3.70	37.00	1,000.00	5.770	0.048
		8. Large gullies, diversions, and low flowing streams	1.87	12.28	657.00	4.100	0.044
#47	**1**	**Time of Concentration:**					**0.146**
#48	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	0.15	1.50	1,000.00	1.160	0.239
#48	**1**	**Time of Concentration:**					**0.301**
#49	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	20.00	1,000.00	1.410	0.197

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.18	4.00	2,201.43	1.270	0.481
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#49	**1**	**Time of Concentration:**					**0.681**
#51	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		8. Large gullies, diversions, and low flowing streams	2.86	12.01	419.94	5.070	0.023
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#51	**1**	**Time of Concentration:**					**0.055**
#54	1	5. Nearly bare and untilled, and alluvial valley fans	2.03	14.00	690.00	1.420	0.134
		8. Large gullies, diversions, and low flowing streams	2.11	20.00	950.00	4.350	0.060
#54	**1**	**Time of Concentration:**					**0.194**
#55	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	2.48	25.54	1,030.00	4.720	0.060
#55	**1**	**Time of Concentration:**					**0.122**
#57	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	1.33	7.98	600.00	3.450	0.048
#57	**1**	**Time of Concentration:**					**0.080**
#59	1	5. Nearly bare and untilled, and alluvial valley fans	0.81	5.00	620.00	0.890	0.193
		8. Large gullies, diversions, and low flowing streams	1.33	21.00	1,580.00	3.450	0.127
#59	**1**	**Time of Concentration:**					**0.320**
#61	1	5. Nearly bare and untilled, and alluvial valley fans	2.71	16.00	590.01	1.640	0.099
		8. Large gullies, diversions, and low flowing streams	1.89	10.00	530.02	4.120	0.035
#61	**1**	**Time of Concentration:**					**0.134**
#65	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	15.00	750.00	1.410	0.147
		9. Small streams flowing bankfull	1.46	29.93	2,050.00	10.870	0.052
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#65	**1**	**Time of Concentration:**					**0.202**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.88	378.00	20,112.80	4.110	1.359
#1	**1**	**Muskingum K:**					**1.359**
#2	1	8. Large gullies, diversions, and low flowing streams	1.44	228.00	15,800.00	3.600	1.219
#2	**1**	**Muskingum K:**					**1.219**
#2	2	8. Large gullies, diversions, and low flowing streams	1.19	202.00	16,912.00	3.270	1.436
#2	**2**	**Muskingum K:**					**1.436**
#2	3	8. Large gullies, diversions, and low flowing streams	1.10	160.00	14,568.00	3.140	1.288
#2	**3**	**Muskingum K:**					**1.288**
#2	4	8. Large gullies, diversions, and low flowing streams	1.09	104.00	9,576.00	3.120	0.852
#2	**4**	**Muskingum K:**					**0.852**
#2	5	8. Large gullies, diversions, and low flowing streams	0.93	44.00	4,715.00	2.890	0.453
#2	**5**	**Muskingum K:**					**0.453**
#3	1	8. Large gullies, diversions, and low flowing streams	1.75	294.00	16,845.00	3.960	1.181
#3	**1**	**Muskingum K:**					**1.181**
#3	2	8. Large gullies, diversions, and low flowing streams	1.79	154.00	8,609.00	4.010	0.596
#3	**2**	**Muskingum K:**					**0.596**
#3	3	8. Large gullies, diversions, and low flowing streams	1.93	92.00	4,778.00	4.160	0.319
#3	**3**	**Muskingum K:**					**0.319**
#4	1	8. Large gullies, diversions, and low flowing streams	1.01	186.00	18,477.00	3.000	1.710
#4	**1**	**Muskingum K:**					**1.710**
#4	2	8. Large gullies, diversions, and low flowing streams	0.98	150.00	15,281.00	2.970	1.429
#4	**2**	**Muskingum K:**					**1.429**
#4	3	8. Large gullies, diversions, and low flowing streams	0.98	104.00	10,645.00	2.960	0.998
#4	**3**	**Muskingum K:**					**0.998**
#5	1	8. Large gullies, diversions, and low flowing streams	0.64	195.00	30,309.00	2.400	3.507
#5	**1**	**Muskingum K:**					**3.507**
#5	2	8. Large gullies, diversions, and low flowing streams	0.60	113.00	18,717.00	2.330	2.231
#5	**2**	**Muskingum K:**					**2.231**
#5	3	8. Large gullies, diversions, and low flowing streams	0.63	85.00	13,541.00	2.370	1.587
#5	**3**	**Muskingum K:**					**1.587**
#5	4	8. Large gullies, diversions, and low flowing streams	0.63	67.00	10,710.00	2.370	1.255
#5	**4**	**Muskingum K:**					**1.255**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	5	8. Large gullies, diversions, and low flowing streams	0.59	53.00	8,978.00	2.300	1.084
#5	**5**	**Muskingum K:**					**1.084**
#5	6	8. Large gullies, diversions, and low flowing streams	0.74	41.00	5,528.00	2.580	0.595
#5	**6**	**Muskingum K:**					**0.595**
#6	1	8. Large gullies, diversions, and low flowing streams	0.94	186.00	19,797.00	2.900	1.896
#6	**1**	**Muskingum K:**					**1.896**
#6	2	8. Large gullies, diversions, and low flowing streams	0.58	8.00	1,372.00	2.290	0.166
#6	**2**	**Muskingum K:**					**0.166**
#27	1	8. Large gullies, diversions, and low flowing streams	0.30	16.15	5,384.09	1.640	0.911
#27	**1**	**Muskingum K:**					**0.000**

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Attachment 26.A-D.2.3
PINABETE DIVERSION and EASTERN DIVERSION
100-Yr 6-Hr Event

Operations - Includes 'U' Storage Area

@ Sta: 118+00, Pinabete Diversion and No Name Impoundment

with Detailed Stormwater Designs

CBEGEJ

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General Information

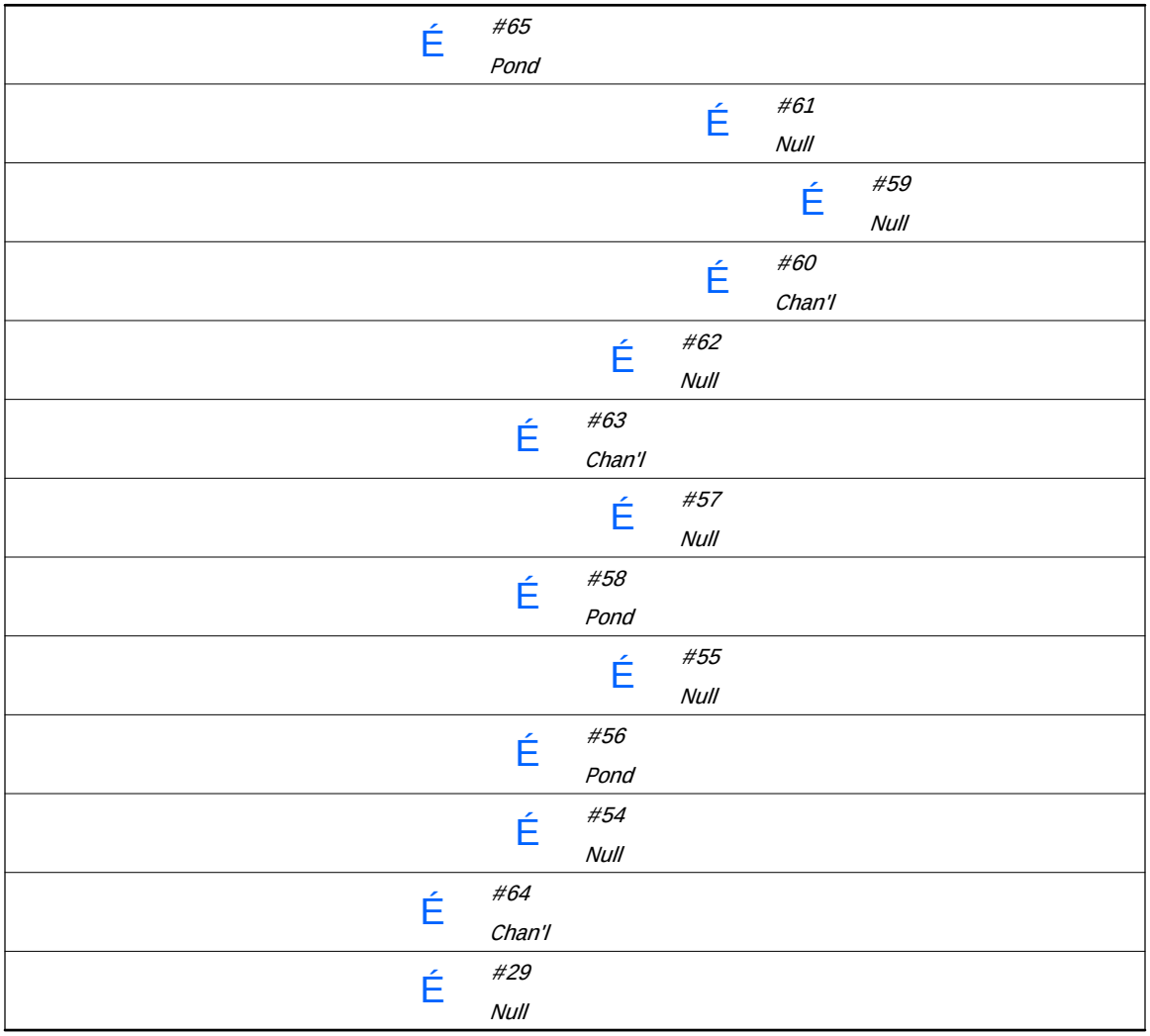
Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	100 yr - 6 hr
Rainfall Depth:	2.040 inches

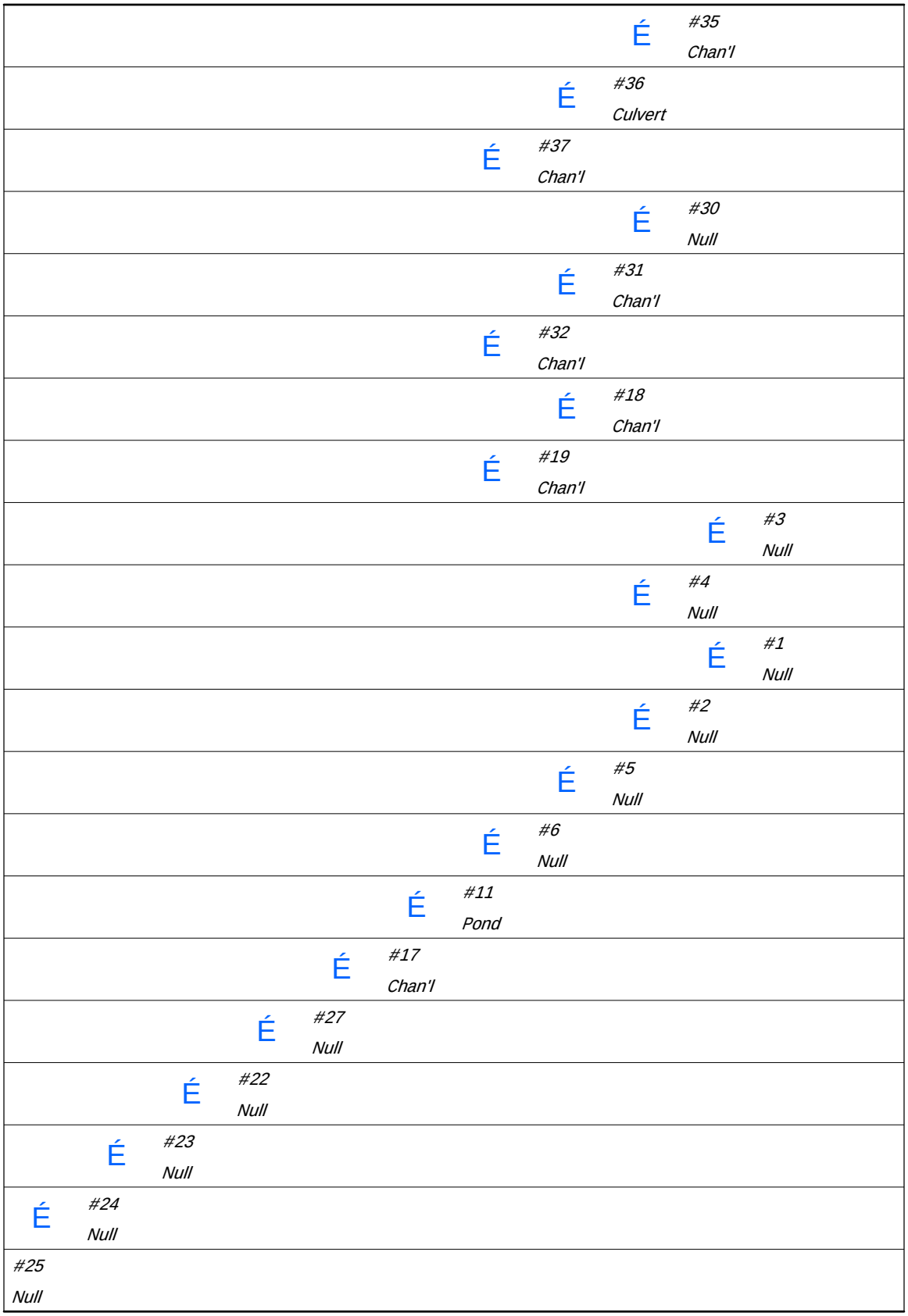
Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	1.674	0.331	
Null	#2	==>	#5	4.188	0.295	
Null	#3	==>	#4	1.961	0.319	
Null	#4	==>	#5	3.103	0.304	
Null	#5	==>	#6	1.300	0.273	
Null	#6	==>	#11	0.000	0.000	EAST LEASE BNDY
Pond	#11	==>	#17	0.124	0.220	Sta:118+00 - U Shaped Impoundment
Channel	#17	==>	#27	2.321	0.220	Pinabete Diversion
Channel	#18	==>	#19	0.074	0.377	Upper East Diversion
Channel	#19	==>	#11	0.576	0.245	Lower E Diversion
Null	#20	==>	#21	0.656	0.345	NN S02 & NN S01
Null	#21	==>	#26	0.000	0.000	NNS03 (NN Imp),04,05
Null	#22	==>	#23	0.096	0.358	NN SO4 (SWS07)
Null	#23	==>	#24	0.681	0.307	NN S05 (SWS08)
Null	#24	==>	#25	1.027	0.307	NN S06 (SWS09,10,11,12,13,14)
Null	#25	==>	End	0.000	0.000	NN S07 (SWS15,16,17,18,19)
Pond	#26	==>	#28	0.063	0.380	Oultet of NN S03 Impoundment Area
Null	#27	==>	#22	0.250	0.320	End of P Diversion, NNSWS06C,S7SW1
Null	#28	==>	#27	0.241	0.246	NNSWS06A (Drop Structure)
Null	#29	==>	#27	0.205	0.246	NNSWS06B (Drop Structure)
Null	#30	==>	#31	0.000	0.000	WS5-1
Channel	#31	==>	#32	0.000	0.000	DD5-1
Channel	#32	==>	#11	0.000	0.000	Ramp Ditch 5
Null	#33	==>	#34	0.000	0.000	MS4-1 & WS4-1
Pond	#34	==>	#35	0.012	0.335	CB4-1
Channel	#35	==>	#36	0.005	0.357	DD4-1
Culvert	#36	==>	#37	0.000	0.000	CP102
Channel	#37	==>	#11	0.000	0.000	DD4-2 Ramp Ditch 4
Null	#38	==>	#39	0.000	0.000	WS3-1
Channel	#39	==>	#42	0.025	0.306	DD3-1
Null	#40	==>	#41	0.000	0.000	MS3-1
Pond	#41	==>	#42	0.000	0.000	CB3-1
Channel	#42	==>	#46	0.026	0.412	DD3-2
Null	#43	==>	#44	0.000	0.000	TDS8
Pond	#44	==>	#45	0.043	0.318	CB3-2
Channel	#45	==>	#46	0.026	0.412	DD3-3
Channel	#46	==>	#17	0.000	0.000	DD3-4 Ramp Ditch 3
Channel	#47	==>	#53	0.000	0.000	WS2-1 & DD2-1
Pond	#48	==>	#49	0.679	0.173	TDS6 & CB2-3
Channel	#49	==>	#50	0.000	0.000	MS2-1 & Ditch

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#50	==>	#53	0.052	0.406	MS2-1 Berm and Spillway (CB2-1)
Pond	#51	==>	#52	0.067	0.210	TDS7TDS & Berm (CB2-2)
Culvert	#52	==>	#53	0.000	0.000	CP101 & Material Stockpile 2
Channel	#53	==>	#17	0.000	0.000	Ramp Ditch-2
Null	#54	==>	#64	0.026	0.412	WS1-1
Null	#55	==>	#56	0.000	0.000	MS1-1
Pond	#56	==>	#64	0.026	0.412	CB1-1
Null	#57	==>	#58	0.000	0.000	TDS5
Pond	#58	==>	#64	0.026	0.412	CB1-2
Null	#59	==>	#60	0.000	0.000	WS1-2
Channel	#60	==>	#62	0.025	0.306	DD1-1
Null	#61	==>	#62	0.000	0.000	WS1-3
Null	#62	==>	#63	0.088	0.312	
Channel	#63	==>	#64	0.026	0.412	DD1-2
Channel	#64	==>	#27	0.663	0.201	Ramp Ditch 1
Pond	#65	==>	#27	0.000	0.000	MS1-2 & Pond 1-1




#20
Null
#21
Null
#26
Pond
#28
Null
#51
Pond
#52
Culvert
#48
Pond
#49
Chan'l
#50
Pond
#47
Chan'l
#53
Chan'l
#43
Null
#44
Pond
#45
Chan'l
#40
Null
#41
Pond
#38
Null
#39
Chan'l
#42
Chan'l
#46
Chan'l
#33
Null
#34
Pond


#35
Chan'l
#36
Culvert
#37
Chan'l
#30
Null
#31
Chan'l
#32
Chan'l
#18
Chan'l
#19
Chan'l
#3
Null
#4
Null
#1
Null
#2
Null
#5
Null
#6
Null
#11
Pond
#17
Chan'l
#27
Null
#22
Null
#23
Null
#24
Null
#25
Null

Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.24	250.00	20,136.00	3.34	1.674
#1	**Muskingum K:**					**1.674**
#2	8. Large gullies, diversions, and low flowing streams	0.67	245.00	36,792.31	2.44	4.188
#2	**Muskingum K:**					**4.188**
#3	8. Large gullies, diversions, and low flowing streams	0.99	210.00	21,118.00	2.99	1.961
#3	**Muskingum K:**					**1.961**
#4	8. Large gullies, diversions, and low flowing streams	0.77	227.00	29,388.00	2.63	3.103
#4	**Muskingum K:**					**3.103**
#5	8. Large gullies, diversions, and low flowing streams	0.47	45.00	9,601.00	2.05	1.300
#5	**Muskingum K:**					**1.300**
#11	8. Large gullies, diversions, and low flowing streams	0.20	1.20	600.00	1.34	0.124
#11	**Muskingum K:**					**0.124**
#17	8. Large gullies, diversions, and low flowing streams	0.20	22.40	11,199.99	1.34	2.321
#17	**Muskingum K:**					**2.321**
#18	8. Large gullies, diversions, and low flowing streams	3.00	42.00	1,400.00	5.19	0.074
#18	**Muskingum K:**					**0.074**
#19	8. Large gullies, diversions, and low flowing streams	0.30	10.00	3,384.00	1.63	0.576
#19	**Muskingum K:**					**0.576**
#26	8. Large gullies, diversions, and low flowing streams	3.23	40.00	1,239.00	5.39	0.063
#26	**Muskingum K:**					**0.063**
#27	8. Large gullies, diversions, and low flowing streams	1.02	28.00	2,736.00	3.03	0.250
#27	**Muskingum K:**					**0.250**
#28	8. Large gullies, diversions, and low flowing streams	0.30	4.26	1,423.00	1.64	0.241
#28	**Muskingum K:**					**0.241**
#29	8. Large gullies, diversions, and low flowing streams	0.30	3.64	1,216.00	1.64	0.205
#29	**Muskingum K:**					**0.205**
#34	8. Large gullies, diversions, and low flowing streams	1.33	1.99	150.00	3.45	0.012
#34	**Muskingum K:**					**0.012**
#35	8. Large gullies, diversions, and low flowing streams	2.00	1.58	79.50	4.24	0.005
#35	**Muskingum K:**					**0.005**
#39	8. Large gullies, diversions, and low flowing streams	0.80	2.00	250.00	2.68	0.025

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#39	**Muskingum K:**					**0.025**
#42	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#42	**Muskingum K:**					**0.026**
#44	8. Large gullies, diversions, and low flowing streams	0.98	4.50	460.00	2.96	0.043
#44	**Muskingum K:**					**0.043**
#45	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#45	**Muskingum K:**					**0.026**
#48	8. Large gullies, diversions, and low flowing streams	0.09	1.98	2,202.63	0.90	0.679
#48	**Muskingum K:**					**0.679**
#50	8. Large gullies, diversions, and low flowing streams	6.00	82.50	1,375.00	7.34	0.052
#50	**Muskingum K:**					**0.052**
#51	8. Large gullies, diversions, and low flowing streams	0.17	0.51	300.12	1.23	0.067
#51	**Muskingum K:**					**0.067**
#54	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#54	**Muskingum K:**					**0.026**
#56	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#56	**Muskingum K:**					**0.026**
#58	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#58	**Muskingum K:**					**0.026**
#60	8. Large gullies, diversions, and low flowing streams	0.80	2.00	249.99	2.68	0.025
#60	**Muskingum K:**					**0.025**
#62	8. Large gullies, diversions, and low flowing streams	0.89	8.01	900.00	2.83	0.088
#62	**Muskingum K:**					**0.088**
#63	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#63	**Muskingum K:**					**0.026**
#64	8. Large gullies, diversions, and low flowing streams	0.15	4.00	2,725.00	1.14	0.663
#64	**Muskingum K:**					**0.663**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#65	In	22.110	22.110	31.43	1.56
	Out			0.00	0.00
#61		34.787	34.787	45.37	2.10
#59		41.030	41.030	42.70	2.43
#60		0.000	41.030	42.70	2.43
#62		0.000	75.817	85.93	4.53
#63		0.000	75.817	82.12	4.53
#57		4.740	4.740	8.09	0.26
#58	In	0.000	4.740	8.09	0.26
	Out			0.79	0.08
#55		4.870	4.870	11.42	0.43
#56	In	0.000	4.870	11.42	0.43
	Out			6.51	0.24
#54		42.850	42.850	52.89	2.55
#64		0.000	128.277	130.32	7.40
#29		286.550	286.550	328.39	17.09
#20		1,855.800	1,855.800	523.14	92.86
#21		2,370.300	4,226.100	1,050.31	247.72
#26	In	13.260	4,239.359	1,051.24	249.21
	Out			934.17	236.40
#28		67.100	4,306.459	936.74	240.37
#51	In	4.820	4.820	8.22	0.26
	Out			0.00	0.00
#52		0.200	5.020	0.47	0.02
#48	In	8.810	8.810	6.93	0.38
	Out			0.00	0.00
#49		37.570	46.380	30.63	2.65
#50	In	0.000	46.380	30.63	2.65
	Out			1.72	0.46
#47		29.270	29.270	31.67	1.42
#53		0.000	80.670	31.73	1.90
#43		6.207	6.207	6.17	0.27
#44	In	0.000	6.207	6.17	0.27
	Out			0.00	0.00
#45		0.000	6.207	0.00	0.00
#40		12.150	12.150	14.35	0.86
#41	In	0.000	12.150	14.35	0.86
	Out			0.00	0.00
#38		66.380	66.380	57.12	3.17

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#39		0.000	66.380	57.12	3.17
#42		0.000	78.530	57.12	3.17
#46		0.000	84.737	57.12	3.17
#33		14.130	14.130	18.03	1.00
#34	In	0.000	14.130	18.03	1.00
	Out			3.53	0.27
#35		0.000	14.130	3.53	0.27
#36		0.000	14.130	3.53	0.27
#37		0.000	14.130	3.53	0.27
#30		282.150	282.150	124.81	13.44
#31		0.000	282.150	124.81	13.44
#32		0.000	282.150	124.81	13.44
#18		1,500.640	1,500.640	235.61	40.22
#19		418.020	1,918.660	372.40	60.11
#3		3,978.700	3,978.700	840.39	155.26
#4		3,216.100	7,194.800	1,161.81	313.80
#1		8,477.899	8,477.899	1,758.29	389.46
#2		3,838.900	12,316.800	1,925.66	652.91
#5		5,494.300	25,005.900	2,878.92	1,345.50
#6		3,036.900	28,042.800	2,856.64	1,533.12
#11	In	53.960	30,311.700	2,859.73	1,612.33
	Out			2,430.73	1,612.33
#17		0.000	30,477.110	2,430.36	1,617.40
#27		43.270	35,263.770	2,428.38	1,884.82
#22		519.990	35,783.760	2,427.78	1,920.13
#23		233.290	36,017.050	2,427.39	1,935.49
#24		1,164.130	37,181.180	2,425.52	2,009.80
#25		648.980	37,830.160	2,422.55	2,049.18

Structure Detail:

Structure #65 (Pond)

MS1-2 & Pond 1-1

Pond Inputs:

Initial Pool Elev:	5,442.10 ft
Initial Pool:	0.03 ac-ft

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
40.00	5,451.80

Pond Results:

Peak Elevation:	5,446.21 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,442.00	0.260	0.000	0.000		
5,442.10	0.265	0.026	0.000		
5,442.50	0.285	0.136	0.000		
5,443.00	0.311	0.285	0.000		
5,443.50	0.339	0.448	0.000		
5,444.00	0.367	0.624	0.000		
5,444.50	0.397	0.815	0.000		
5,445.00	0.427	1.021	0.000		
5,445.50	0.459	1.242	0.000		
5,446.00	0.492	1.480	0.000		
5,446.21	0.507	1.587	0.000	0.00	Peak Stage
5,446.50	0.526	1.734	0.000		
5,447.00	0.562	2.006	0.000		
5,447.50	0.598	2.296	0.000		
5,448.00	0.636	2.605	0.000		
5,448.50	0.675	2.933	0.000		
5,449.00	0.715	3.280	0.000		
5,449.50	0.756	3.648	0.000		
5,450.00	0.798	4.036	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,450.50	0.841	4.446	0.000		
5,451.00	0.886	4.878	0.000		
5,451.50	0.931	5.332	0.000		
5,451.80	0.959	5.615	0.000		Spillway #1
5,452.00	0.978	5.809	11.061		

Detailed Discharge Table

Elevation (ft)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,442.00	0.000	0.000
5,442.10	0.000	0.000
5,442.50	0.000	0.000
5,443.00	0.000	0.000
5,443.50	0.000	0.000
5,444.00	0.000	0.000
5,444.50	0.000	0.000
5,445.00	0.000	0.000
5,445.50	0.000	0.000
5,446.00	0.000	0.000
5,446.50	0.000	0.000
5,447.00	0.000	0.000
5,447.50	0.000	0.000
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,451.80	0.000	0.000
5,452.00	11.061	11.061

Structure #61 (Null)

WS1-3

Structure #59 (Null)

WS1-2

Structure #60 (Erodible Channel)

DD1-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	42.70 cfs	
Depth:	1.57 ft	2.57 ft
Top Width:	9.42 ft	15.42 ft
Velocity:	5.77 fps	
X-Section Area:	7.40 sq ft	
Hydraulic Radius:	0.745 ft	
Froude Number:	1.15	

Structure #62 (Null)

Structure #63 (Erodible Channel)

DD1-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.2	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	82.12 cfs	
Depth:	1.11 ft	2.11 ft
Top Width:	16.45 ft	20.45 ft
Velocity:	5.19 fps	
X-Section Area:	15.82 sq ft	
Hydraulic Radius:	0.932 ft	
Froude Number:	0.93	

Structure #57 (Null)

TDS5

Structure #58 (Pond)

CB1-2

Pond Inputs:

Initial Pool Elev:	5,450.50 ft
Initial Pool:	0.24 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,451.60 ft
Dewater Time:	0.14 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,449.00	0.150	0.000	0.000		
5,449.50	0.156	0.076	0.000		
5,450.00	0.162	0.156	0.000		
5,450.50	0.168	0.238	0.000		
5,451.00	0.174	0.324	0.000		
5,451.50	0.180	0.413	0.000		Spillway #1
5,451.60	0.182	0.431	0.793	3.40	Peak Stage
5,452.00	0.187	0.504	3.871		
5,452.50	0.193	0.599	51.179		
5,453.00	0.200	0.698	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #55 (Null)

MS1-1

Structure #56 (Pond)

CB1-1

Pond Inputs:

Initial Pool Elev:	5,449.70 ft
Initial Pool:	0.20 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,451.53 ft
Dewater Time:	0.16 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,448.00	0.100	0.000	0.000		
5,448.50	0.108	0.052	0.000		
5,449.00	0.117	0.108	0.000		
5,449.50	0.131	0.170	0.000		
5,449.70	0.137	0.197	0.000		
5,449.75	0.139	0.204	0.000		
5,450.00	0.146	0.240	0.000		
5,450.25	0.148	0.277	0.000		
5,450.50	0.151	0.314	0.000		
5,451.00	0.156	0.391	0.000		Spillway #1

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,451.50	0.166	0.471	3.871		
5,451.53	0.167	0.476	6.508	3.80	Peak Stage
5,452.00	0.177	0.557	51.179		
5,452.50	0.188	0.648	105.737		
5,453.00	0.200	0.745	174.956		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,449.70	0.000	0.000
5,449.75	0.000	0.000
5,450.00	0.000	0.000
5,450.25	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	3.871	3.871
5,452.00	51.179	51.179
5,452.50	105.737	105.737
5,453.00	174.956	174.956

Structure #54 (Null)

WS1-1

Structure #64 (Riprap Channel)

Ramp Ditch 1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	130.32 cfs	
Depth:	0.87 ft	1.87 ft
Top Width:	15.47 ft	19.47 ft
Velocity*:		
X-Section Area:	11.92 sq ft	
Hydraulic Radius:	0.751 ft	
Froude Number*:		
Manning's n*:		
Dmin:	4.00 in	
D50:	12.00 in	
Dmax:	15.00 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #29 (Null)

NNSWS06B (Drop Structure)

Structure #20 (Null)

NN S02 & NN S01

Structure #21 (Null)

NNS03 (NN Imp),04,05

Structure #26 (Pond)

Oultet of NN S03 Impoundment Area

Pond Inputs:

Initial Pool Elev:	5,441.01 ft
Initial Pool:	0.00 ac-ft

Pond Results:

Peak Elevation:	5,449.48 ft
Dewater Time:	0.80 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,441.00	0.000	0.000	0.000	
5,441.01	0.011	0.000	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,442.00	1.075	0.394	0.001		
5,443.00	2.094	1.951	0.001		
5,444.00	2.823	4.400	0.001		
5,445.00	4.127	7.855	0.001		
5,446.00	5.827	12.807	0.001		
5,447.00	7.996	19.690	55.000	14.75	
5,448.00	10.478	28.899	300.000	2.85	
5,448.48	12.103	34.314	574.837	0.65	
5,449.00	13.565	40.984	872.600	0.35	
5,449.48	14.958	48.220	934.166	0.60	Peak Stage
5,450.00	16.428	55.958	1,000.000		

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,441.00	0.000	0.000
5,441.01	0.000	0.000
5,442.00	0.001	0.001
5,443.00	0.001	0.001
5,444.00	0.001	0.001
5,445.00	0.001	0.001
5,446.00	0.001	0.001
5,447.00	55.000	55.000
5,448.00	300.000	300.000
5,448.48	574.837	574.837
5,449.00	872.600	872.600
5,450.00	1,000.000	1,000.000

Structure #28 (Null)

NNSWS06A (Drop Structure)

Structure #51 (Pond)

TDS7TDS & Berm (CB2-2)

Pond Inputs:

Initial Pool Elev:	5,474.20 ft
Initial Pool:	0.01 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,477.00	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,476.14 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,474.00	0.057	0.000	0.000		
5,474.01	0.058	0.001	0.000		
5,474.20	0.068	0.013	0.000		
5,474.50	0.086	0.036	0.000		
5,475.00	0.118	0.086	0.000		
5,475.50	0.156	0.155	0.000		
5,476.00	0.200	0.243	0.000		
5,476.14	0.212	0.274	0.000	0.00	Peak Stage
5,476.50	0.243	0.354	0.000		
5,477.00	0.291	0.487	0.000		Spillway #1
5,477.50	0.343	0.646	2.913		
5,478.00	0.400	0.832	39.083		
5,478.50	0.446	1.043	81.546		
5,479.00	0.495	1.278	136.186		
5,479.50	0.546	1.538	202.723		
5,480.00	0.600	1.825	281.166		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,474.00	0.000	0.000
5,474.01	0.000	0.000
5,474.20	0.000	0.000
5,474.50	0.000	0.000
5,475.00	0.000	0.000
5,475.50	0.000	0.000
5,476.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.50	0.000	0.000
5,477.00	0.000	0.000
5,477.50	2.913	2.913
5,478.00	39.083	39.083
5,478.50	81.546	81.546
5,479.00	136.186	136.186
5,479.50	202.723	202.723
5,480.00	281.166	281.166

Structure #52 (Culvert)

CP101 & Material Stockpile 2

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.00	0.0240	1.00	0.50	0.90

Culvert Results:

Design Discharge = 0.47 cfs

Minimum pipe diameter: 1 - 8 inch pipe(s) required

Structure #48 (Pond)

TDS6 & CB2-3

Pond Inputs:

Initial Pool Elev:	5,484.40 ft
Initial Pool:	0.38 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,486.00	100.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,485.68 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,482.00	0.100	0.000	0.000		
5,482.50	0.122	0.055	0.000		
5,483.00	0.146	0.122	0.000		
5,483.50	0.172	0.202	0.000		
5,484.00	0.200	0.295	0.000		
5,484.40	0.235	0.382	0.000		
5,484.50	0.244	0.405	0.000		
5,484.70	0.263	0.456	0.000		
5,484.75	0.267	0.469	0.000		
5,485.00	0.291	0.539	0.000		
5,485.50	0.343	0.698	0.000		
5,485.68	0.365	0.764	0.000	0.00	Peak Stage
5,486.00	0.400	0.883	0.000		Spillway #1
5,486.50	0.446	1.095	11.938		
5,487.00	0.495	1.330	23.876		
5,487.50	0.546	1.590	54.567		
5,488.00	0.600	1.877	96.681		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,482.00	0.000	0.000
5,482.50	0.000	0.000
5,483.00	0.000	0.000
5,483.50	0.000	0.000
5,484.00	0.000	0.000
5,484.40	0.000	0.000
5,484.50	0.000	0.000
5,484.70	0.000	0.000
5,484.75	0.000	0.000
5,485.00	0.000	0.000
5,485.50	0.000	0.000
5,486.00	0.000	0.000
5,486.50	11.938	11.938
5,487.00	23.876	23.876
5,487.50	54.567	54.567
5,488.00	96.681	96.681

Structure #49 (Erodible Channel)

MS2-1 & Ditch

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	0.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	30.63 cfs	
Depth:	0.68 ft	1.68 ft
Top Width:	14.72 ft	18.72 ft
Velocity:	3.37 fps	
X-Section Area:	9.09 sq ft	
Hydraulic Radius:	0.604 ft	
Froude Number:	0.76	

Structure #50 (Pond)

MS2-1 Berm and Spillway (CB2-1)

Pond Inputs:

Initial Pool Elev:	5,480.00 ft
Initial Pool:	1.89 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,482.00	15.00	2.00:1	2.00:1	25.00

Pond Results:

Peak Elevation:	5,482.18 ft
Dewater Time:	0.43 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,476.00	0.230	0.000	0.000	
5,476.50	0.268	0.124	0.000	
5,477.00	0.309	0.269	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,477.50	0.353	0.434	0.000		
5,478.00	0.400	0.622	0.000		
5,478.50	0.506	0.848	0.000		
5,479.00	0.625	1.130	0.000		
5,479.50	0.758	1.476	0.000		
5,479.75	0.828	1.674	0.000		
5,480.00	0.900	1.890	0.000		
5,480.20	0.938	2.074	0.000		
5,480.50	0.994	2.363	0.000		
5,480.82	1.056	2.691	0.000		
5,481.00	1.091	2.884	0.000		
5,481.50	1.193	3.455	0.000		
5,482.00	1.300	4.078	0.000		Spillway #1
5,482.18	1.270	4.311	1.725	10.35	Peak Stage
5,482.50	1.306	4.730	4.829		
5,483.00	1.312	5.384	63.277		
5,483.50	1.318	6.042	129.940		
5,484.00	1.325	6.703	213.757		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.00	0.000	0.000
5,476.50	0.000	0.000
5,477.00	0.000	0.000
5,477.50	0.000	0.000
5,478.00	0.000	0.000
5,478.50	0.000	0.000
5,479.00	0.000	0.000
5,479.50	0.000	0.000
5,479.75	0.000	0.000
5,480.00	0.000	0.000
5,480.20	0.000	0.000
5,480.50	0.000	0.000
5,480.82	0.000	0.000
5,481.00	0.000	0.000
5,481.50	0.000	0.000
5,482.00	0.000	0.000
5,482.50	4.829	4.829

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,483.00	63.277	63.277
5,483.50	129.940	129.940
5,484.00	213.757	213.757

Structure #47 (Erodible Channel)

WS2-1 & DD2-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	31.67 cfs	
Depth:	0.56 ft	1.56 ft
Top Width:	14.23 ft	18.23 ft
Velocity:	4.34 fps	
X-Section Area:	7.30 sq ft	
Hydraulic Radius:	0.504 ft	
Froude Number:	1.07	

Structure #53 (Riprap Channel)

Ramp Ditch-2

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
6.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	31.73 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	0.44 ft	1.44 ft
Top Width:	7.77 ft	11.77 ft
Velocity*:		
X-Section Area:	3.06 sq ft	
Hydraulic Radius:	0.383 ft	
Froude Number*:		
Manning's n*:		
Dmin:	3.00 in	
D50:	9.00 in	
Dmax:	11.25 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #43 (Null)

TDS8

Structure #44 (Pond)

CB3-2

Pond Inputs:

Initial Pool Elev:	5,468.70 ft
Initial Pool:	0.18 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,470.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,469.73 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,468.00	0.250	0.000	0.000	
5,468.50	0.256	0.126	0.000	
5,468.70	0.258	0.178	0.000	
5,468.80	0.260	0.204	0.000	
5,469.00	0.262	0.256	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,469.20	0.264	0.309	0.000		
5,469.31	0.266	0.338	0.000		
5,469.50	0.268	0.388	0.000		
5,469.73	0.271	0.452	0.000	0.00	Peak Stage
5,470.00	0.274	0.524	0.000		Spillway #1
5,470.50	0.280	0.663	3.871		
5,471.00	0.287	0.804	51.179		
5,471.50	0.293	0.950	105.737		
5,472.00	0.300	1.098	174.956		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,468.00	0.000	0.000
5,468.50	0.000	0.000
5,468.70	0.000	0.000
5,468.80	0.000	0.000
5,469.00	0.000	0.000
5,469.20	0.000	0.000
5,469.31	0.000	0.000
5,469.50	0.000	0.000
5,470.00	0.000	0.000
5,470.50	3.871	3.871
5,471.00	51.179	51.179
5,471.50	105.737	105.737
5,472.00	174.956	174.956

Structure #45 (Erodible Channel)

DD3-3

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.00 cfs	
Depth:	0.01 ft	1.01 ft
Top Width:	0.06 ft	6.06 ft
Velocity:	0.20 fps	
X-Section Area:	0.00 sq ft	
Hydraulic Radius:	0.005 ft	
Froude Number:	0.49	

Structure #40 (Null)

MS3-1

Structure #41 (Pond)

CB3-1

Pond Inputs:

Initial Pool Elev:	5,464.10 ft
Initial Pool:	0.05 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,465.91 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,464.00	0.450	0.000	0.000		
5,464.10	0.452	0.045	0.000		
5,464.20	0.455	0.091	0.000		
5,464.50	0.462	0.228	0.000		
5,465.00	0.474	0.462	0.000		
5,465.50	0.486	0.702	0.000		
5,465.65	0.490	0.775	0.000		
5,465.91	0.497	0.904	0.000	0.00	Peak Stage
5,466.00	0.499	0.948	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,466.50	0.511	1.201	0.000		
5,466.60	0.514	1.252	0.000		Spillway #1
5,467.00	0.524	1.460	14.423		
5,467.50	0.537	1.725	32.456		
5,468.00	0.550	1.997	72.062		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,464.00	0.000	0.000
5,464.10	0.000	0.000
5,464.20	0.000	0.000
5,464.50	0.000	0.000
5,465.00	0.000	0.000
5,465.50	0.000	0.000
5,465.65	0.000	0.000
5,466.00	0.000	0.000
5,466.50	0.000	0.000
5,466.60	0.000	0.000
5,467.00	14.423	14.423
5,467.50	32.456	32.456
5,468.00	72.062	72.062

Structure #38 (Null)

WS3-1

Structure #39 (Erodible Channel)

DD3-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.4	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	57.12 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	0.86 ft	1.86 ft
Top Width:	15.45 ft	19.45 ft
Velocity:	4.83 fps	
X-Section Area:	11.82 sq ft	
Hydraulic Radius:	0.746 ft	
Froude Number:	0.97	

Structure #42 (Erodible Channel)

DD3-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	57.12 cfs	
Depth:	0.84 ft	1.84 ft
Top Width:	15.38 ft	19.38 ft
Velocity:	4.94 fps	
X-Section Area:	11.56 sq ft	
Hydraulic Radius:	0.733 ft	
Froude Number:	1.00	

Structure #46 (Riprap Channel)

DD3-4 Ramp Ditch 3

Triangular Riprap Channel Inputs:

Material: Riprap

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	57.12 cfs	
Depth:	1.87 ft	2.87 ft
Top Width:	7.49 ft	11.49 ft
Velocity:	8.15 fps	
X-Section Area:	7.01 sq ft	
Hydraulic Radius:	0.837 ft	
Froude Number:	1.48	
Manning's n:	0.0430	
Dmin:	3.00 in	
D50:	6.00 in	
Dmax:	9.00 in	

Structure #33 (Null)

MS4-1 & WS4-1

Structure #34 (Pond)

CB4-1

Pond Inputs:

Initial Pool Elev:	5,464.90 ft
Initial Pool:	0.81 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,466.67 ft
Dewater Time:	0.15 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,462.00	0.200	0.000	0.000	
5,462.01	0.200	0.002	0.000	
5,462.50	0.225	0.106	0.000	
5,463.00	0.252	0.226	0.000	
5,463.50	0.280	0.359	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,464.00	0.310	0.506	0.000		
5,464.50	0.341	0.669	0.000		
5,464.90	0.367	0.810	0.000		
5,465.00	0.373	0.847	0.000		
5,465.50	0.407	1.042	0.000		
5,466.00	0.443	1.255	0.000		
5,466.50	0.480	1.485	0.000		
5,466.60	0.487	1.534	0.000		Spillway #1
5,466.67	0.493	1.571	3.532	3.50	Peak Stage
5,467.00	0.518	1.735	18.923		
5,467.50	0.558	2.004	42.582		
5,468.00	0.600	2.293	93.619		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,462.00	0.000	0.000
5,462.01	0.000	0.000
5,462.50	0.000	0.000
5,463.00	0.000	0.000
5,463.50	0.000	0.000
5,464.00	0.000	0.000
5,464.50	0.000	0.000
5,464.90	0.000	0.000
5,465.00	0.000	0.000
5,465.50	0.000	0.000
5,466.00	0.000	0.000
5,466.50	0.000	0.000
5,466.60	0.000	0.000
5,467.00	18.923	18.923
5,467.50	42.582	42.582
5,468.00	93.619	93.619

Structure #35 (Erodible Channel)

DD4-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	0.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.53 cfs	
Depth:	0.80 ft	1.80 ft
Top Width:	4.80 ft	10.80 ft
Velocity:	1.84 fps	
X-Section Area:	1.92 sq ft	
Hydraulic Radius:	0.379 ft	
Froude Number:	0.51	

Structure #36 (Culvert)

CP102

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.50	0.0240	2.00	1.50	0.90

Culvert Results:

Design Discharge = 3.53 cfs

Minimum pipe diameter: 1 - 15 inch pipe(s) required

Structure #37 (Riprap Channel)

DD4-2 Ramp Ditch 4

Triangular Riprap Channel Inputs:

Material: Riprap

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.53 cfs	
Depth:	0.62 ft	1.62 ft

	w/o Freeboard	w/ Freeboard
Top Width:	2.49 ft	6.49 ft
Velocity:	4.55 fps	
X-Section Area:	0.78 sq ft	
Hydraulic Radius:	0.279 ft	
Froude Number:	1.44	
Manning's n:	0.0370	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #30 (Null)

WS5-1

Structure #31 (Erodible Channel)

DD5-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	124.81 cfs	
Depth:	1.49 ft	2.49 ft
Top Width:	17.96 ft	21.96 ft
Velocity:	5.59 fps	
X-Section Area:	22.31 sq ft	
Hydraulic Radius:	1.195 ft	
Froude Number:	0.88	

Structure #32 (Riprap Channel)

Ramp Ditch 5

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	124.81 cfs	
Depth:	1.12 ft	2.12 ft
Top Width:	16.47 ft	20.47 ft
Velocity:	7.85 fps	
X-Section Area:	15.89 sq ft	
Hydraulic Radius:	0.935 ft	
Froude Number:	1.41	
Manning's n:	0.0480	
Dmin:	3.00 in	
D50:	6.00 in	
Dmax:	9.00 in	

Structure #18 (Erodible Channel)

Upper East Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
14.00	2.0:1	2.0:1	0.6	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	235.61 cfs	
Depth:	2.48 ft	
Top Width:	23.92 ft	
Velocity:	5.01 fps	
X-Section Area:	47.01 sq ft	
Hydraulic Radius:	1.874 ft	
Froude Number:	0.63	

Structure #19 (Erodible Channel)

Lower E Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
14.00	2.0:1	2.0:1	0.3	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	372.40 cfs	
Depth:	3.83 ft	
Top Width:	29.33 ft	
Velocity:	4.48 fps	
X-Section Area:	83.05 sq ft	
Hydraulic Radius:	2.667 ft	
Froude Number:	0.47	

Structure #3 (Null)

Structure #4 (Null)

Structure #1 (Null)

Structure #2 (Null)

Structure #5 (Null)

Structure #6 (Null)

EAST LEASE BNDY

Structure #11 (Pond)

Sta:118+00 - U Shaped Impoundment

Pond Inputs:

Initial Pool Elev:	5,430.01 ft
Initial Pool:	0.00 ac-ft

Pond Results:

Peak Elevation:	5,450.20 ft
Dewater Time:	1.52 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,430.00	0.000	0.000	0.000		
5,430.01	0.002	0.000	0.000		
5,431.00	0.225	0.082	3.900	1.70	
5,432.00	0.822	0.575	8.230	1.05	
5,433.00	2.809	2.292	17.280	1.70	
5,434.00	6.235	6.701	31.060	2.25	
5,435.00	11.008	15.210	45.120	2.75	
5,436.00	16.934	29.075	65.530	3.05	
5,437.00	24.132	49.503	92.860	3.15	
5,438.00	29.977	76.504	129.180	3.00	
5,439.00	36.455	109.667	168.090	2.70	
5,440.00	39.413	147.592	209.680	2.45	
5,441.00	42.486	188.531	263.440	2.10	
5,442.00	43.250	231.399	329.180	1.75	
5,443.00	44.020	275.033	421.610	1.45	
5,444.00	44.637	319.361	515.750	1.15	
5,445.00	45.259	364.309	594.490	1.05	
5,446.00	46.060	409.968	807.140	0.95	
5,447.00	46.869	456.432	1,021.210	0.75	
5,448.00	48.100	503.915	1,167.930	0.80	
5,449.00	49.346	552.637	1,720.410	0.75	
5,450.00	51.291	602.952	2,309.040	1.00	
5,450.20	51.696	613.225	2,430.735	0.95	Peak Stage
5,451.00	53.274	655.232	2,928.330		
5,452.00	56.392	710.057	3,767.860		
5,452.50	57.976	738.649	4,223.680		
5,453.00	59.573	768.035	4,693.290		
5,454.00	65.520	830.558	5,723.400		
5,455.00	71.750	899.169	6,850.570		

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,430.00	0.000	0.000
5,430.01	0.000	0.000
5,431.00	3.900	3.900
5,432.00	8.230	8.230
5,433.00	17.280	17.280

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,434.00	31.060	31.060
5,435.00	45.120	45.120
5,436.00	65.530	65.530
5,437.00	92.860	92.860
5,438.00	129.180	129.180
5,439.00	168.090	168.090
5,440.00	209.680	209.680
5,441.00	263.440	263.440
5,442.00	329.180	329.180
5,443.00	421.610	421.610
5,444.00	515.750	515.750
5,445.00	594.490	594.490
5,446.00	807.140	807.140
5,447.00	1,021.210	1,021.210
5,448.00	1,167.930	1,167.930
5,449.00	1,720.410	1,720.410
5,450.00	2,309.040	2,309.040
5,451.00	2,928.330	2,928.330
5,452.00	3,767.860	3,767.860
5,452.50	4,223.680	4,223.680
5,453.00	4,693.290	4,693.290
5,454.00	5,723.400	5,723.400
5,455.00	6,850.570	6,850.570

Structure #17 (Erodible Channel)

Pinabete Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
45.00	2.0:1	2.0:1	0.2	0.0400		50.00		5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	2,430.36 cfs	
Depth:	7.55 ft	11.33 ft
Top Width:	75.21 ft	90.31 ft
Velocity:	5.35 fps	
X-Section Area:	453.91 sq ft	

	w/o Freeboard	w/ Freeboard
Hydraulic Radius:	5.762 ft	
Froude Number:	0.38	

Structure #27 (Null)

End of P Diversion, NNSWS06C,S7SW1

Structure #22 (Null)

NN SO4 (SWS07)

Structure #23 (Null)

NN S05 (SWS08)

Structure #24 (Null)

NN S06 (SWS09,10,11,12,13,14)

Structure #25 (Null)

NN S07 (SWS15,16,17,18,19)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#65	1	22.110	0.202	0.000	0.000	89.000	M	31.43	1.561
	Σ	**22.110**						**31.43**	**1.561**
#61	1	34.787	0.134	0.000	0.000	86.200	M	45.37	2.098
	Σ	**34.787**						**45.37**	**2.098**
#59	1	41.030	0.320	0.000	0.000	86.200	M	42.70	2.434
	Σ	**41.030**						**42.70**	**2.434**
#60	Σ	**41.030**						**42.70**	**2.434**
#62	Σ	**75.817**						**85.93**	**4.532**
#63	Σ	**75.817**						**82.12**	**4.532**
#57	1	4.740	0.080	0.000	0.000	81.500	M	8.09	0.257
	Σ	**4.740**						**8.09**	**0.257**
#58	Σ	**4.740**						**8.09**	**0.257**
#55	1	4.870	0.122	0.000	0.000	89.000	M	11.42	0.430
	Σ	**4.870**						**11.42**	**0.430**
#56	Σ	**4.870**						**11.42**	**0.430**
#54	1	42.850	0.194	0.000	0.000	86.200	M	52.89	2.552
	Σ	**42.850**						**52.89**	**2.552**
#64	Σ	**128.277**						**130.32**	**7.404**
#29	1	286.550	0.248	0.000	0.000	86.200	M	328.39	17.091
	Σ	**286.550**						**328.39**	**17.091**
#20	1	856.430	1.610	0.000	0.000	85.700	M	298.08	49.005
	2	999.370	1.260	0.814	0.291	81.700	M	317.58	43.858
	Σ	**1,855.800**						**523.14**	**92.862**
#21	1	925.920	1.675	0.409	0.297	88.800	M	383.46	64.381
	2	1,019.220	1.106	0.193	0.261	87.000	M	518.03	63.355
	3	425.160	0.766	0.000	0.000	87.400	M	287.88	27.124
	Σ	**4,226.100**						**1,050.31**	**247.723**
#26	1	13.260	0.076	0.000	0.000	93.000	M	35.49	1.491
	Σ	**4,239.359**						**1,051.24**	**249.214**
#28	1	67.100	0.380	0.000	0.000	86.200	M	64.53	3.967
	Σ	**4,306.459**						**936.74**	**240.367**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#51	1	4.820	0.055	0.000	0.000	81.500	M	8.22	0.261
	Σ	**4.820**						**8.22**	**0.261**
#52	1	0.200	0.004	0.000	0.000	89.000	M	0.47	0.017
	Σ	**5.020**						**0.47**	**0.017**
#48	1	8.810	0.301	0.000	0.000	81.500	M	6.93	0.383
	Σ	**8.810**						**6.93**	**0.383**
#49	1	37.570	0.681	0.000	0.000	89.000	M	30.63	2.647
	Σ	**46.380**						**30.63**	**2.647**
#50	Σ	**46.380**						**30.63**	**2.647**
#47	1	29.270	0.146	0.000	0.000	82.900	M	31.67	1.423
	Σ	**29.270**						**31.67**	**1.423**
#53	Σ	**80.670**						**31.73**	**1.897**
#43	1	6.207	0.137	0.000	0.000	81.500	M	6.17	0.274
	Σ	**6.207**						**6.17**	**0.274**
#44	Σ	**6.207**						**6.17**	**0.274**
#45	Σ	**6.207**						**0.00**	**0.000**
#40	1	12.150	0.354	0.000	0.000	89.000	M	14.35	0.859
	Σ	**12.150**						**14.35**	**0.859**
#41	Σ	**12.150**						**14.35**	**0.859**
#38	1	66.380	0.302	0.000	0.000	82.900	M	57.12	3.173
	Σ	**66.380**						**57.12**	**3.173**
#39	Σ	**66.380**						**57.12**	**3.173**
#42	Σ	**78.530**						**57.12**	**3.173**
#46	Σ	**84.737**						**57.12**	**3.173**
#33	1	14.130	0.291	0.000	0.000	89.000	M	18.03	0.998
	Σ	**14.130**						**18.03**	**0.998**
#34	Σ	**14.130**						**18.03**	**0.998**
#35	Σ	**14.130**						**3.53**	**0.274**
#36	Σ	**14.130**						**3.53**	**0.274**
#37	Σ	**14.130**						**3.53**	**0.274**
#30	1	282.150	0.909	0.000	0.000	82.900	M	124.81	13.442
	Σ	**282.150**						**124.81**	**13.442**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#31	**∑**	**282.150**						**124.81**	**13.442**
#32	**∑**	**282.150**						**124.81**	**13.442**
#18	1	1,352.640	1.370	0.000	0.000	75.000	M	234.63	35.952
	2	148.000	1.315	1.026	0.249	76.000	M	28.92	4.265
	∑	**1,500.640**						**235.61**	**40.217**
#19	1	418.020	1.293	0.000	0.000	82.900	M	142.13	19.896
	∑	**1,918.660**						**372.40**	**60.114**
#3	1	791.300	1.145	1.181	0.350	80.800	M	252.88	32.619
	2	1,079.100	0.915	0.596	0.351	80.900	M	410.04	44.812
	3	450.300	0.571	0.319	0.355	81.300	M	244.20	19.245
	4	742.600	0.625	0.000	0.000	78.500	M	305.73	25.912
	5	915.400	1.119	0.000	0.000	78.800	M	254.63	32.672
	∑	**3,978.700**						**840.39**	**155.260**
#4	1	546.400	0.726	1.710	0.319	81.700	M	259.48	23.994
	2	441.200	0.503	1.429	0.318	86.000	M	358.34	25.779
	3	889.400	0.815	0.998	0.318	82.100	M	401.16	40.129
	4	1,339.100	0.919	0.000	0.000	84.000	M	635.38	68.640
	∑	**7,194.800**						**1,161.81**	**313.802**
#1	1	1,242.300	1.349	1.359	0.354	80.800	M	350.01	51.197
	2	1,662.000	1.465	0.865	0.359	80.300	M	422.54	66.107
	3	1,434.000	1.573	1.257	0.357	81.100	M	366.26	60.354
	4	842.700	1.102	0.977	0.364	81.000	M	281.43	35.225
	5	676.100	1.067	1.113	0.365	81.600	M	241.95	29.468
	6	1,223.200	0.778	0.596	0.352	81.800	M	557.61	54.077
	7	743.100	0.745	0.530	0.354	83.600	M	397.26	37.097
	8	654.500	0.801	0.000	0.000	92.200	M	585.23	55.938
	∑	**8,477.899**						**1,758.29**	**389.465**
#2	1	609.500	0.668	1.219	0.340	85.700	M	404.67	34.927
	2	537.100	0.610	1.436	0.329	91.600	M	553.64	44.327
	3	455.000	0.546	1.288	0.324	82.000	M	267.07	20.396
	4	627.000	0.634	0.852	0.324	87.900	M	498.81	41.252
	5	653.100	0.452	0.453	0.315	91.200	M	780.45	52.619
	6	957.200	0.984	0.000	0.000	89.600	M	627.22	69.921
	∑	**12,316.800**						**1,925.66**	**652.908**
#5	1	763.100	0.682	3.507	0.293	84.100	M	448.54	39.385
	2	983.300	1.117	2.231	0.289	89.200	M	572.37	70.073
	3	1,022.000	0.996	1.587	0.291	92.000	M	774.06	86.324
	4	688.700	1.908	1.255	0.291	80.800	M	147.50	28.380

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
	5	754.300	2.307	1.084	0.287	86.200	M	202.49	44.558
	6	628.400	0.538	0.595	0.301	93.000	M	758.23	56.383
	7	654.500	0.560	0.000	0.000	91.500	M	706.54	53.686
	Σ	**25,005.900**						**2,878.92**	**1,345.499**
#6	1	901.400	1.151	1.896	0.315	81.100	M	293.51	37.945
	2	1,011.200	1.871	0.166	0.287	83.500	M	267.73	50.109
	3	1,124.300	1.126	0.000	0.000	92.800	M	818.04	99.565
	Σ	**28,042.800**						**2,856.64**	**1,533.118**
#11	1	53.960	0.000	0.000	0.000	91.000	M	135.73	5.382
	Σ	**30,311.700**						**2,859.73**	**1,612.330**
#17	**Σ**	**30,477.110**						**2,430.36**	**1,617.401**
#27	1	43.270	0.441	0.000	0.000	86.200	M	38.46	2.561
	Σ	**35,263.770**						**2,428.38**	**1,884.822**
#22	1	519.990	0.565	0.000	0.000	88.400	M	460.23	35.304
	Σ	**35,783.760**						**2,427.78**	**1,920.126**
#23	1	233.290	0.469	0.000	0.000	87.900	M	223.49	15.369
	Σ	**36,017.050**						**2,427.39**	**1,935.495**
#24	1	126.980	0.164	0.545	0.308	86.900	M	171.89	8.007
	2	235.630	0.327	0.427	0.341	86.700	M	250.67	14.433
	3	258.380	0.416	0.365	0.294	88.300	M	270.95	17.491
	4	180.930	0.449	0.176	0.301	86.700	M	164.46	11.048
	5	189.850	0.326	0.146	0.330	86.800	M	203.46	11.701
	6	172.360	0.753	0.000	0.000	88.300	M	125.38	11.629
	Σ	**37,181.180**						**2,425.52**	**2,009.804**
#25	1	91.450	0.220	0.854	0.310	86.800	M	112.63	5.652
	2	286.490	0.566	0.642	0.312	87.100	M	232.68	17.936
	3	75.280	0.179	0.610	0.308	86.800	M	98.97	4.700
	4	128.700	0.157	0.270	0.325	86.800	M	173.30	8.064
	5	67.060	0.333	0.000	0.000	82.000	M	52.00	3.019
	Σ	**37,830.160**						**2,422.55**	**2,049.175**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.99	22.00	736.00	1.720	0.118

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.63	66.00	10,511.22	2.370	1.231
#1	**1**	**Time of Concentration:**					**1.349**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	6.24	30.00	481.00	2.490	0.053
		8. Large gullies, diversions, and low flowing streams	3.34	406.00	12,141.00	5.480	0.615
#2	**1**	**Time of Concentration:**					**0.668**
#2	2	5. Nearly bare and untilled, and alluvial valley fans	3.16	30.00	950.00	1.770	0.149
		8. Large gullies, diversions, and low flowing streams	4.22	432.00	10,229.00	6.160	0.461
#2	**2**	**Time of Concentration:**					**0.610**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	2.65	10.00	378.00	1.620	0.064
		8. Large gullies, diversions, and low flowing streams	2.72	234.00	8,592.00	4.950	0.482
#2	**3**	**Time of Concentration:**					**0.546**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	3.07	25.00	815.00	1.750	0.129
		8. Large gullies, diversions, and low flowing streams	3.32	330.00	9,931.00	5.460	0.505
#2	**4**	**Time of Concentration:**					**0.634**
#2	5	5. Nearly bare and untilled, and alluvial valley fans	7.45	45.00	604.00	2.720	0.061
		8. Large gullies, diversions, and low flowing streams	3.78	310.00	8,210.00	5.820	0.391
#2	**5**	**Time of Concentration:**					**0.452**
#2	6	5. Nearly bare and untilled, and alluvial valley fans	9.10	80.00	879.00	3.010	0.081
		8. Large gullies, diversions, and low flowing streams	2.32	344.00	14,831.00	4.560	0.903
#2	**6**	**Time of Concentration:**					**0.984**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	1.29	15.00	1,163.00	1.130	0.285
		8. Large gullies, diversions, and low flowing streams	2.37	338.00	14,280.00	4.610	0.860
#3	**1**	**Time of Concentration:**					**1.145**
#3	2	5. Nearly bare and untilled, and alluvial valley fans	3.04	33.00	1,087.00	1.740	0.173
		8. Large gullies, diversions, and low flowing streams	2.06	238.00	11,527.00	4.310	0.742
#3	**2**	**Time of Concentration:**					**0.915**
#3	3	5. Nearly bare and untilled, and alluvial valley fans	5.02	45.00	897.00	2.230	0.111
		8. Large gullies, diversions, and low flowing streams	3.09	270.00	8,741.00	5.270	0.460
#3	**3**	**Time of Concentration:**					**0.571**
#3	4	5. Nearly bare and untilled, and alluvial valley fans	7.41	28.00	378.00	2.720	0.038

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	3.43	402.00	11,736.00	5.550	0.587
#3	**4**	**Time of Concentration:**					**0.625**
#3	5	5. Nearly bare and untilled, and alluvial valley fans	3.39	30.00	885.00	1.840	0.133
		8. Large gullies, diversions, and low flowing streams	2.58	442.00	17,121.00	4.820	0.986
#3	**5**	**Time of Concentration:**					**1.119**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	3.59	62.00	1,729.00	1.890	0.254
		8. Large gullies, diversions, and low flowing streams	2.09	154.00	7,372.00	4.330	0.472
#4	**1**	**Time of Concentration:**					**0.726**
#4	2	5. Nearly bare and untilled, and alluvial valley fans	6.83	25.00	366.00	2.610	0.038
		8. Large gullies, diversions, and low flowing streams	2.36	182.00	7,708.00	4.600	0.465
#4	**2**	**Time of Concentration:**					**0.503**
#4	3	5. Nearly bare and untilled, and alluvial valley fans	19.03	47.00	247.00	4.360	0.015
		8. Large gullies, diversions, and low flowing streams	2.13	268.00	12,586.00	4.370	0.800
#4	**3**	**Time of Concentration:**					**0.815**
#4	4	5. Nearly bare and untilled, and alluvial valley fans	14.08	50.00	355.00	3.750	0.026
		8. Large gullies, diversions, and low flowing streams	2.46	372.00	15,119.00	4.700	0.893
#4	**4**	**Time of Concentration:**					**0.919**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	12.55	65.00	518.00	3.540	0.040
		8. Large gullies, diversions, and low flowing streams	1.92	184.00	9,592.00	4.150	0.642
#5	**1**	**Time of Concentration:**					**0.682**
#5	2	5. Nearly bare and untilled, and alluvial valley fans	5.10	30.00	588.00	2.250	0.072
		8. Large gullies, diversions, and low flowing streams	1.77	266.00	15,016.00	3.990	1.045
#5	**2**	**Time of Concentration:**					**1.117**
#5	3	5. Nearly bare and untilled, and alluvial valley fans	1.90	20.00	1,050.00	1.380	0.211
		8. Large gullies, diversions, and low flowing streams	2.19	274.00	12,532.00	4.430	0.785
#5	**3**	**Time of Concentration:**					**0.996**
#5	4	5. Nearly bare and untilled, and alluvial valley fans	2.78	32.00	1,152.00	1.660	0.192
		8. Large gullies, diversions, and low flowing streams	0.99	182.00	18,415.00	2.980	1.716
#5	**4**	**Time of Concentration:**					**1.908**
#5	5	5. Nearly bare and untilled, and alluvial valley fans	2.52	23.00	911.00	1.580	0.160

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	1.07	256.00	23,965.00	3.100	2.147
#5	**5**	**Time of Concentration:**					**2.307**
#5	6	5. Nearly bare and untilled, and alluvial valley fans	6.36	25.00	393.00	2.520	0.043
		8. Large gullies, diversions, and low flowing streams	2.39	198.00	8,272.00	4.640	0.495
#5	**6**	**Time of Concentration:**					**0.538**
#5	7	5. Nearly bare and untilled, and alluvial valley fans	9.66	28.00	290.00	3.100	0.025
		8. Large gullies, diversions, and low flowing streams	2.12	179.00	8,427.00	4.370	0.535
#5	**7**	**Time of Concentration:**					**0.560**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	31.83	120.00	377.00	5.640	0.018
		8. Large gullies, diversions, and low flowing streams	1.38	198.00	14,361.00	3.520	1.133
#6	**1**	**Time of Concentration:**					**1.151**
#6	2	5. Nearly bare and untilled, and alluvial valley fans	4.25	40.00	941.00	2.060	0.126
		8. Large gullies, diversions, and low flowing streams	0.96	176.00	18,407.00	2.930	1.745
#6	**2**	**Time of Concentration:**					**1.871**
#6	3	5. Nearly bare and untilled, and alluvial valley fans	4.35	25.00	575.00	2.080	0.076
		8. Large gullies, diversions, and low flowing streams	1.57	224.00	14,223.00	3.760	1.050
#6	**3**	**Time of Concentration:**					**1.126**
#26	1	8. Large gullies, diversions, and low flowing streams	2.35	30.00	1,275.00	4.600	0.076
#26	**1**	**Time of Concentration:**					**0.076**
#27	1	5. Nearly bare and untilled, and alluvial valley fans	2.60	15.60	600.00	1.610	0.103
		8. Large gullies, diversions, and low flowing streams	0.92	32.00	3,493.83	2.870	0.338
#27	**1**	**Time of Concentration:**					**0.441**
#28	1	8. Large gullies, diversions, and low flowing streams	2.92	80.00	2,740.30	5.120	0.148
		8. Large gullies, diversions, and low flowing streams	2.60	105.00	4,042.56	4.830	0.232
#28	**1**	**Time of Concentration:**					**0.380**
#29	1	8. Large gullies, diversions, and low flowing streams	3.69	120.00	3,255.51	5.750	0.157
		8. Large gullies, diversions, and low flowing streams	0.87	8.00	921.20	2.790	0.091
#29	**1**	**Time of Concentration:**					**0.248**
#30	1	5. Nearly bare and untilled, and alluvial valley fans	2.56	42.03	1,642.00	1.590	0.286
		5. Nearly bare and untilled, and alluvial valley fans	1.42	17.99	1,267.00	1.190	0.295

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.94	18.00	1,915.00	2.900	0.183
		8. Large gullies, diversions, and low flowing streams	0.25	1.95	784.00	1.500	0.145
#30	**1**	**Time of Concentration:**					**0.909**
#33	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	9.39	469.50	1.410	0.092
		8. Large gullies, diversions, and low flowing streams	0.50	7.50	1,500.00	2.120	0.196
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#33	**1**	**Time of Concentration:**					**0.291**
#38	1	5. Nearly bare and untilled, and alluvial valley fans	2.50	2.00	80.00	1.580	0.014
		7. Paved area and small upland gullies	4.80	16.03	334.00	4.410	0.021
		7. Paved area and small upland gullies	1.80	27.75	1,542.00	2.700	0.158
		8. Large gullies, diversions, and low flowing streams	1.42	19.99	1,408.00	3.570	0.109
#38	**1**	**Time of Concentration:**					**0.302**
#40	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	13.29	664.53	1.410	0.130
		8. Large gullies, diversions, and low flowing streams	0.30	3.93	1,310.00	1.640	0.221
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#40	**1**	**Time of Concentration:**					**0.354**
#43	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		8. Large gullies, diversions, and low flowing streams	1.50	15.00	1,000.00	3.670	0.075
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#43	**1**	**Time of Concentration:**					**0.137**
#47	1	5. Nearly bare and untilled, and alluvial valley fans	2.33	6.99	300.00	1.520	0.054
		8. Large gullies, diversions, and low flowing streams	3.70	37.00	1,000.00	5.770	0.048
		8. Large gullies, diversions, and low flowing streams	1.87	12.28	657.00	4.100	0.044
#47	**1**	**Time of Concentration:**					**0.146**
#48	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	0.15	1.50	1,000.00	1.160	0.239
#48	**1**	**Time of Concentration:**					**0.301**
#49	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	20.00	1,000.00	1.410	0.197

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.18	4.00	2,201.43	1.270	0.481
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#49	**1**	**Time of Concentration:**					**0.681**
#51	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		8. Large gullies, diversions, and low flowing streams	2.86	12.01	419.94	5.070	0.023
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#51	**1**	**Time of Concentration:**					**0.055**
#54	1	5. Nearly bare and untilled, and alluvial valley fans	2.03	14.00	690.00	1.420	0.134
		8. Large gullies, diversions, and low flowing streams	2.11	20.00	950.00	4.350	0.060
#54	**1**	**Time of Concentration:**					**0.194**
#55	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	2.48	25.54	1,030.00	4.720	0.060
#55	**1**	**Time of Concentration:**					**0.122**
#57	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	1.33	7.98	600.00	3.450	0.048
#57	**1**	**Time of Concentration:**					**0.080**
#59	1	5. Nearly bare and untilled, and alluvial valley fans	0.81	5.00	620.00	0.890	0.193
		8. Large gullies, diversions, and low flowing streams	1.33	21.00	1,580.00	3.450	0.127
#59	**1**	**Time of Concentration:**					**0.320**
#61	1	5. Nearly bare and untilled, and alluvial valley fans	2.71	16.00	590.01	1.640	0.099
		8. Large gullies, diversions, and low flowing streams	1.89	10.00	530.02	4.120	0.035
#61	**1**	**Time of Concentration:**					**0.134**
#65	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	15.00	750.00	1.410	0.147
		9. Small streams flowing bankfull	1.46	29.93	2,050.00	10.870	0.052
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#65	**1**	**Time of Concentration:**					**0.202**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.88	378.00	20,112.80	4.110	1.359
#1	**1**	**Muskingum K:**					**1.359**
#2	1	8. Large gullies, diversions, and low flowing streams	1.44	228.00	15,800.00	3.600	1.219
#2	**1**	**Muskingum K:**					**1.219**
#2	2	8. Large gullies, diversions, and low flowing streams	1.19	202.00	16,912.00	3.270	1.436
#2	**2**	**Muskingum K:**					**1.436**
#2	3	8. Large gullies, diversions, and low flowing streams	1.10	160.00	14,568.00	3.140	1.288
#2	**3**	**Muskingum K:**					**1.288**
#2	4	8. Large gullies, diversions, and low flowing streams	1.09	104.00	9,576.00	3.120	0.852
#2	**4**	**Muskingum K:**					**0.852**
#2	5	8. Large gullies, diversions, and low flowing streams	0.93	44.00	4,715.00	2.890	0.453
#2	**5**	**Muskingum K:**					**0.453**
#3	1	8. Large gullies, diversions, and low flowing streams	1.75	294.00	16,845.00	3.960	1.181
#3	**1**	**Muskingum K:**					**1.181**
#3	2	8. Large gullies, diversions, and low flowing streams	1.79	154.00	8,609.00	4.010	0.596
#3	**2**	**Muskingum K:**					**0.596**
#3	3	8. Large gullies, diversions, and low flowing streams	1.93	92.00	4,778.00	4.160	0.319
#3	**3**	**Muskingum K:**					**0.319**
#4	1	8. Large gullies, diversions, and low flowing streams	1.01	186.00	18,477.00	3.000	1.710
#4	**1**	**Muskingum K:**					**1.710**
#4	2	8. Large gullies, diversions, and low flowing streams	0.98	150.00	15,281.00	2.970	1.429
#4	**2**	**Muskingum K:**					**1.429**
#4	3	8. Large gullies, diversions, and low flowing streams	0.98	104.00	10,645.00	2.960	0.998
#4	**3**	**Muskingum K:**					**0.998**
#5	1	8. Large gullies, diversions, and low flowing streams	0.64	195.00	30,309.00	2.400	3.507
#5	**1**	**Muskingum K:**					**3.507**
#5	2	8. Large gullies, diversions, and low flowing streams	0.60	113.00	18,717.00	2.330	2.231
#5	**2**	**Muskingum K:**					**2.231**
#5	3	8. Large gullies, diversions, and low flowing streams	0.63	85.00	13,541.00	2.370	1.587
#5	**3**	**Muskingum K:**					**1.587**
#5	4	8. Large gullies, diversions, and low flowing streams	0.63	67.00	10,710.00	2.370	1.255
#5	**4**	**Muskingum K:**					**1.255**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	5	8. Large gullies, diversions, and low flowing streams	0.59	53.00	8,978.00	2.300	1.084
#5	**5**	**Muskingum K:**					**1.084**
#5	6	8. Large gullies, diversions, and low flowing streams	0.74	41.00	5,528.00	2.580	0.595
#5	**6**	**Muskingum K:**					**0.595**
#6	1	8. Large gullies, diversions, and low flowing streams	0.94	186.00	19,797.00	2.900	1.896
#6	**1**	**Muskingum K:**					**1.896**
#6	2	8. Large gullies, diversions, and low flowing streams	0.58	8.00	1,372.00	2.290	0.166
#6	**2**	**Muskingum K:**					**0.166**
#27	1	8. Large gullies, diversions, and low flowing streams	0.30	16.15	5,384.09	1.640	0.911
#27	**1**	**Muskingum K:**					**0.000**

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Attachment 26.A-D.2.2

PINABETE DIVERSION and EASTERN DIVERSION

25-Yr 6-Hr Event

Operations - Includes 'U' Storage Area

@ Sta: 118+00, Pinabete Diversion and No Name Impoundment

with Detailed Stormwater Designs

Ponds Full

CBEGEJ

General Information

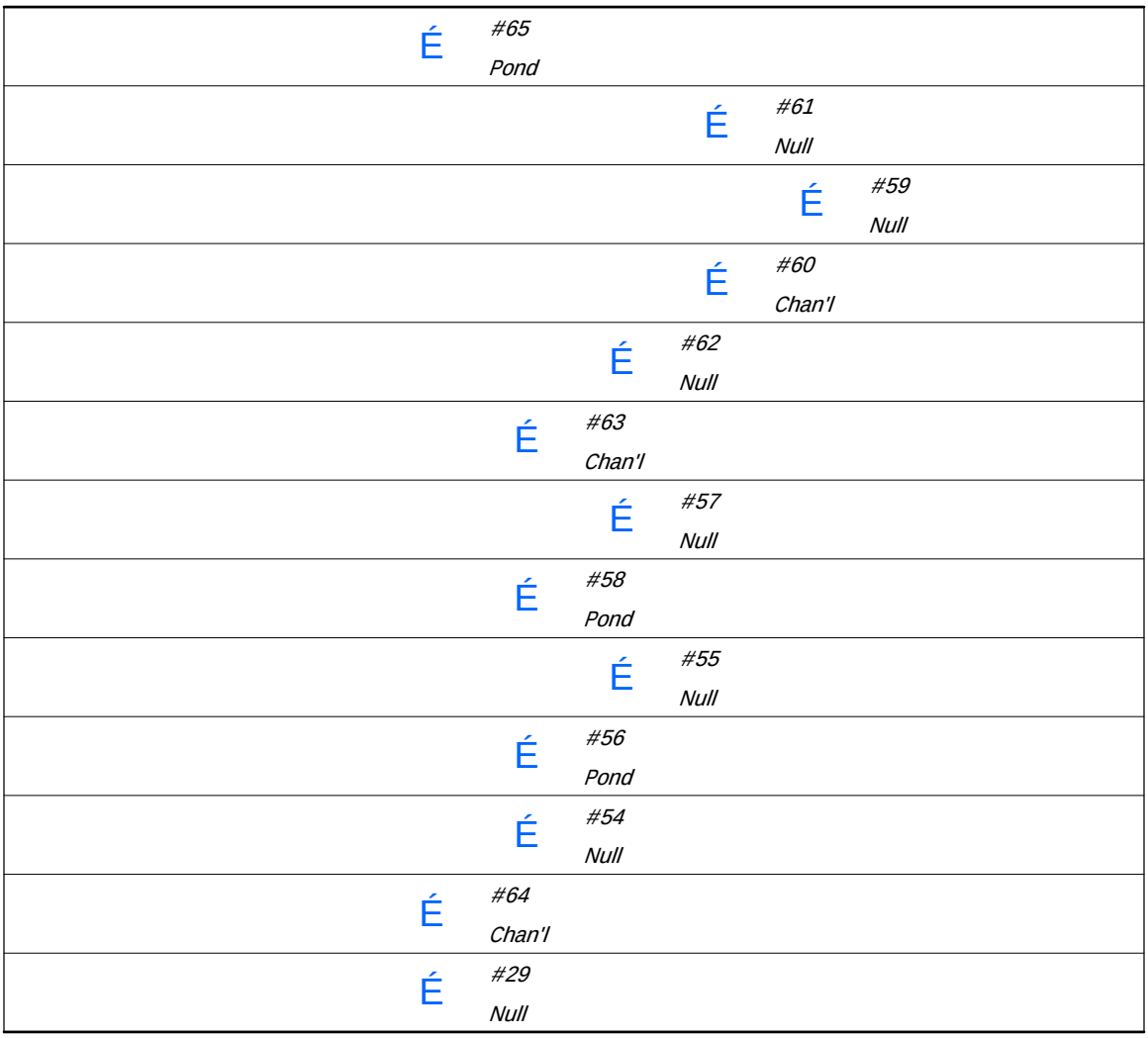
Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	25 yr - 6 hr
Rainfall Depth:	1.560 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	1.674	0.331	
Null	#2	==>	#5	4.188	0.295	
Null	#3	==>	#4	1.961	0.319	
Null	#4	==>	#5	3.103	0.304	
Null	#5	==>	#6	1.300	0.273	
Null	#6	==>	#11	0.000	0.000	EAST LEASE BNDY
Pond	#11	==>	#17	0.124	0.220	Sta:118+00 - U Shaped Impoundment
Channel	#17	==>	#27	2.321	0.220	Pinabete Diversion
Channel	#18	==>	#19	0.074	0.377	Upper East Diversion
Channel	#19	==>	#11	0.576	0.245	Lower E Diversion
Null	#20	==>	#21	0.656	0.345	NN S02 & NN S01
Null	#21	==>	#26	0.000	0.000	NNS03 (NN Imp),04,05
Null	#22	==>	#23	0.096	0.358	NN SO4 (SWS07)
Null	#23	==>	#24	0.681	0.307	NN S05 (SWS08)
Null	#24	==>	#25	1.027	0.307	NN S06 (SWS09,10,11,12,13,14)
Null	#25	==>	End	0.000	0.000	NN S07 (SWS15,16,17,18,19)
Pond	#26	==>	#28	0.063	0.380	Oultet of NN S03 Impoundment Area
Null	#27	==>	#22	0.250	0.320	End of P Diversion, NNSWS06C,S7SW1
Null	#28	==>	#27	0.241	0.246	NNSWS06A (Drop Structure)
Null	#29	==>	#27	0.205	0.246	NNSWS06B (Drop Structure)
Null	#30	==>	#31	0.000	0.000	WS5-1
Channel	#31	==>	#32	0.000	0.000	DD5-1
Channel	#32	==>	#11	0.000	0.000	Ramp Ditch 5
Null	#33	==>	#34	0.000	0.000	MS4-1 & WS4-1
Pond	#34	==>	#35	0.012	0.335	CB4-1
Channel	#35	==>	#36	0.005	0.357	DD4-1
Culvert	#36	==>	#37	0.000	0.000	CP102
Channel	#37	==>	#11	0.000	0.000	DD4-2 Ramp Ditch 4
Null	#38	==>	#39	0.000	0.000	WS3-1
Channel	#39	==>	#42	0.025	0.306	DD3-1
Null	#40	==>	#41	0.000	0.000	MS3-1
Pond	#41	==>	#42	0.000	0.000	CB3-1
Channel	#42	==>	#46	0.026	0.412	DD3-2
Null	#43	==>	#44	0.000	0.000	TDS8
Pond	#44	==>	#45	0.043	0.318	CB3-2
Channel	#45	==>	#46	0.026	0.412	DD3-3
Channel	#46	==>	#17	0.000	0.000	DD3-4 Ramp Ditch 3
Channel	#47	==>	#53	0.000	0.000	WS2-1 & DD2-1
Pond	#48	==>	#49	0.679	0.173	TDS6 & CB2-3
Channel	#49	==>	#50	0.000	0.000	MS2-1 & Ditch

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#50	==>	#53	0.052	0.406	MS2-1 Berm and Spillway (CB2-1)
Pond	#51	==>	#52	0.067	0.210	TDS7TDS & Berm (CB2-2)
Culvert	#52	==>	#53	0.000	0.000	CP101 & Material Stockpile 2
Channel	#53	==>	#17	0.000	0.000	Ramp Ditch-2
Null	#54	==>	#64	0.026	0.412	WS1-1
Null	#55	==>	#56	0.000	0.000	MS1-1
Pond	#56	==>	#64	0.026	0.412	CB1-1
Null	#57	==>	#58	0.000	0.000	TDS5
Pond	#58	==>	#64	0.026	0.412	CB1-2
Null	#59	==>	#60	0.000	0.000	WS1-2
Channel	#60	==>	#62	0.025	0.306	DD1-1
Null	#61	==>	#62	0.000	0.000	WS1-3
Null	#62	==>	#63	0.088	0.312	
Channel	#63	==>	#64	0.026	0.412	DD1-2
Channel	#64	==>	#27	0.663	0.201	Ramp Ditch 1
Pond	#65	==>	#27	0.000	0.000	MS1-2 & Pond 1-1




#20
Null
#21
Null
#26
Pond
#28
Null
#51
Pond
#52
Culvert
#48
Pond
#49
Chan'l
#50
Pond
#47
Chan'l
#53
Chan'l
#43
Null
#44
Pond
#45
Chan'l
#40
Null
#41
Pond
#38
Null
#39
Chan'l
#42
Chan'l
#46
Chan'l
#33
Null
#34
Pond

É #35 Chan'l
É #36 Culvert
É #37 Chan'l
É #30 Null
É #31 Chan'l
É #32 Chan'l
É #18 Chan'l
É #19 Chan'l
É #3 Null
É #4 Null
É #1 Null
É #2 Null
É #5 Null
É #6 Null
É #11 Pond
É #17 Chan'l
É #27 Null
É #22 Null
É #23 Null
É #24 Null
#25 Null

Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.24	250.00	20,136.00	3.34	1.674
#1	**Muskingum K:**					**1.674**
#2	8. Large gullies, diversions, and low flowing streams	0.67	245.00	36,791.00	2.44	4.188
#2	**Muskingum K:**					**4.188**
#3	8. Large gullies, diversions, and low flowing streams	0.99	210.00	21,118.00	2.99	1.961
#3	**Muskingum K:**					**1.961**
#4	8. Large gullies, diversions, and low flowing streams	0.77	227.00	29,388.00	2.63	3.103
#4	**Muskingum K:**					**3.103**
#5	8. Large gullies, diversions, and low flowing streams	0.47	45.00	9,601.00	2.05	1.300
#5	**Muskingum K:**					**1.300**
#11	8. Large gullies, diversions, and low flowing streams	0.20	1.20	600.00	1.34	0.124
#11	**Muskingum K:**					**0.124**
#17	8. Large gullies, diversions, and low flowing streams	0.20	22.40	11,199.99	1.34	2.321
#17	**Muskingum K:**					**2.321**
#18	8. Large gullies, diversions, and low flowing streams	3.00	42.00	1,400.00	5.19	0.074
#18	**Muskingum K:**					**0.074**
#19	8. Large gullies, diversions, and low flowing streams	0.30	10.00	3,384.00	1.63	0.576
#19	**Muskingum K:**					**0.576**
#26	8. Large gullies, diversions, and low flowing streams	3.23	40.00	1,239.00	5.39	0.063
#26	**Muskingum K:**					**0.063**
#27	8. Large gullies, diversions, and low flowing streams	1.02	28.00	2,736.00	3.03	0.250
#27	**Muskingum K:**					**0.250**
#28	8. Large gullies, diversions, and low flowing streams	0.30	4.26	1,423.00	1.64	0.241
#28	**Muskingum K:**					**0.241**
#29	8. Large gullies, diversions, and low flowing streams	0.30	3.64	1,216.00	1.64	0.205
#29	**Muskingum K:**					**0.205**
#34	8. Large gullies, diversions, and low flowing streams	1.33	1.99	150.00	3.45	0.012
#34	**Muskingum K:**					**0.012**
#35	8. Large gullies, diversions, and low flowing streams	2.00	1.58	79.50	4.24	0.005
#35	**Muskingum K:**					**0.005**
#39	8. Large gullies, diversions, and low flowing streams	0.80	2.00	250.00	2.68	0.025

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#39	**Muskingum K:**					**0.025**
#42	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#42	**Muskingum K:**					**0.026**
#44	8. Large gullies, diversions, and low flowing streams	0.98	4.50	460.00	2.96	0.043
#44	**Muskingum K:**					**0.043**
#45	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#45	**Muskingum K:**					**0.026**
#48	8. Large gullies, diversions, and low flowing streams	0.09	1.98	2,202.63	0.90	0.679
#48	**Muskingum K:**					**0.679**
#50	8. Large gullies, diversions, and low flowing streams	6.00	82.50	1,375.00	7.34	0.052
#50	**Muskingum K:**					**0.052**
#51	8. Large gullies, diversions, and low flowing streams	0.17	0.51	300.12	1.23	0.067
#51	**Muskingum K:**					**0.067**
#54	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#54	**Muskingum K:**					**0.026**
#56	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#56	**Muskingum K:**					**0.026**
#58	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#58	**Muskingum K:**					**0.026**
#60	8. Large gullies, diversions, and low flowing streams	0.80	2.00	250.00	2.68	0.025
#60	**Muskingum K:**					**0.025**
#62	8. Large gullies, diversions, and low flowing streams	0.89	8.01	900.00	2.83	0.088
#62	**Muskingum K:**					**0.088**
#63	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#63	**Muskingum K:**					**0.026**
#64	8. Large gullies, diversions, and low flowing streams	0.15	4.00	2,725.00	1.14	0.663
#64	**Muskingum K:**					**0.663**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#65	In	22.110	22.110	20.41	0.99
	Out			14.70	0.99
#61		34.787	34.787	28.43	1.27
#59		41.030	41.030	25.94	1.48
#60		0.000	41.030	25.94	1.48
#62		0.000	75.817	52.41	2.75
#63		0.000	75.817	50.21	2.75
#57		4.740	4.740	4.92	0.14
#58	In	0.000	4.740	4.92	0.14
	Out			2.36	0.14
#55		4.870	4.870	7.80	0.27
#56	In	0.000	4.870	7.80	0.27
	Out			7.68	0.27
#54		42.850	42.850	33.09	1.55
#64		0.000	128.277	82.36	4.72
#29		286.550	286.550	201.95	10.38
#20		1,855.800	1,855.800	297.11	53.97
#21		2,370.300	4,226.100	643.10	150.71
#26	In	13.260	4,239.359	643.78	151.72
	Out			606.13	138.91
#28		67.100	4,306.459	608.48	141.32
#51	In	4.820	4.820	5.00	0.15
	Out			1.37	0.15
#52		0.200	5.020	1.33	0.16
#48	In	8.810	8.810	3.87	0.21
	Out			2.69	0.21
#49		37.570	46.380	19.37	1.90
#50	In	0.000	46.380	19.37	1.90
	Out			12.08	1.90
#47		29.270	29.270	18.61	0.81
#53		0.000	80.670	20.62	2.87
#43		6.207	6.207	3.52	0.15
#44	In	0.000	6.207	3.52	0.15
	Out			1.55	0.15
#45		0.000	6.207	1.55	0.15
#40		12.150	12.150	9.18	0.55
#41	In	0.000	12.150	9.18	0.55
	Out			7.36	0.55
#38		66.380	66.380	32.98	1.81

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#39		0.000	66.380	32.98	1.81
#42		0.000	78.530	39.79	2.36
#46		0.000	84.737	41.28	2.51
#33		14.130	14.130	11.61	0.64
#34	In	0.000	14.130	11.61	0.64
	Out			9.88	0.64
#35		0.000	14.130	9.88	0.64
#36		0.000	14.130	9.88	0.64
#37		0.000	14.130	9.88	0.64
#30		282.150	282.150	69.69	7.68
#31		0.000	282.150	69.69	7.68
#32		0.000	282.150	69.69	7.68
#18		1,500.640	1,500.640	105.10	19.01
#19		418.020	1,918.660	181.83	30.38
#3		3,978.700	3,978.700	435.68	83.60
#4		3,216.100	7,194.800	626.52	175.22
#1		8,477.899	8,477.899	964.91	222.07
#2		3,838.900	12,316.800	1,115.80	389.57
#5		5,494.300	25,005.900	1,715.48	806.96
#6		3,036.900	28,042.800	1,702.17	924.31
#11	In	53.960	30,311.700	1,703.88	966.56
	Out			1,104.50	966.56
#17		0.000	30,477.110	1,104.30	971.94
#27		43.270	35,263.770	1,102.60	1,130.91
#22		519.990	35,783.760	1,102.33	1,153.18
#23		233.290	36,017.050	1,102.18	1,162.80
#24		1,164.130	37,181.180	1,101.36	1,208.86
#25		648.980	37,830.160	1,100.11	1,232.93

Structure Detail:

Structure #65 (Pond)

MS1-2 & Pond 1-1

Pond Inputs:

Initial Pool Elev:	5,451.80 ft
Initial Pool:	5.62 ac-ft

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
40.00	5,451.80

Pond Results:

Peak Elevation:	5,452.07 ft
Dewater Time:	0.17 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,442.00	0.260	0.000	0.000	
5,442.10	0.265	0.026	0.000	
5,442.50	0.285	0.136	0.000	
5,443.00	0.311	0.285	0.000	
5,443.50	0.339	0.448	0.000	
5,444.00	0.367	0.624	0.000	
5,444.50	0.397	0.815	0.000	
5,445.00	0.427	1.021	0.000	
5,445.50	0.459	1.242	0.000	
5,446.00	0.492	1.480	0.000	
5,446.50	0.526	1.734	0.000	
5,447.00	0.562	2.006	0.000	
5,447.50	0.598	2.296	0.000	
5,448.00	0.636	2.605	0.000	
5,448.50	0.675	2.933	0.000	
5,449.00	0.715	3.280	0.000	
5,449.50	0.756	3.648	0.000	
5,450.00	0.798	4.036	0.000	
5,450.50	0.841	4.446	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,451.00	0.886	4.878	0.000		
5,451.50	0.931	5.332	0.000		
5,451.80	0.959	5.615	0.000		Spillway #1
5,452.00	0.978	5.809	11.061		

Detailed Discharge Table

Elevation (ft)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,442.00	0.000	0.000
5,442.10	0.000	0.000
5,442.50	0.000	0.000
5,443.00	0.000	0.000
5,443.50	0.000	0.000
5,444.00	0.000	0.000
5,444.50	0.000	0.000
5,445.00	0.000	0.000
5,445.50	0.000	0.000
5,446.00	0.000	0.000
5,446.50	0.000	0.000
5,447.00	0.000	0.000
5,447.50	0.000	0.000
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,451.80	0.000	0.000
5,452.00	11.061	11.061

Structure #61 (Null)

WS1-3

Structure #59 (Null)

WS1-2

Structure #60 (Erodible Channel)

DD1-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	25.94 cfs	
Depth:	1.30 ft	2.30 ft
Top Width:	7.82 ft	13.82 ft
Velocity:	5.10 fps	
X-Section Area:	5.09 sq ft	
Hydraulic Radius:	0.618 ft	
Froude Number:	1.11	

Structure #62 (Null)

Structure #63 (Erodible Channel)

DD1-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.2	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	50.21 cfs	
Depth:	0.84 ft	1.84 ft
Top Width:	15.34 ft	19.34 ft
Velocity:	4.39 fps	
X-Section Area:	11.42 sq ft	
Hydraulic Radius:	0.726 ft	
Froude Number:	0.90	

Structure #57 (Null)

TDS5

Structure #58 (Pond)

CB1-2

Pond Inputs:

Initial Pool Elev:	5,451.50 ft
Initial Pool:	0.41 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,451.81 ft
Dewater Time:	0.15 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,449.00	0.150	0.000	0.000		
5,449.50	0.156	0.076	0.000		
5,450.00	0.162	0.156	0.000		
5,450.50	0.168	0.238	0.000		
5,451.00	0.174	0.324	0.000		
5,451.50	0.180	0.413	0.000		Spillway #1
5,451.81	0.184	0.469	2.363	3.70	Peak Stage
5,452.00	0.187	0.504	3.871		
5,452.50	0.193	0.599	51.179		
5,453.00	0.200	0.698	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #55 (Null)

MS1-1

Structure #56 (Pond)

CB1-1

Pond Inputs:

Initial Pool Elev:	5,451.00 ft
Initial Pool:	0.39 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,451.54 ft
Dewater Time:	0.16 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,448.00	0.100	0.000	0.000		
5,448.50	0.108	0.052	0.000		
5,449.00	0.117	0.108	0.000		
5,449.50	0.131	0.170	0.000		
5,449.70	0.137	0.197	0.000		
5,449.75	0.139	0.204	0.000		
5,450.00	0.146	0.240	0.000		
5,450.25	0.148	0.277	0.000		
5,450.50	0.151	0.314	0.000		
5,451.00	0.156	0.391	0.000		Spillway #1
5,451.50	0.166	0.471	3.871	3.70	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,451.54	0.167	0.478	7.682	0.05	Peak Stage
5,452.00	0.177	0.557	51.179		
5,452.50	0.188	0.648	105.737		
5,453.00	0.200	0.745	174.956		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,449.70	0.000	0.000
5,449.75	0.000	0.000
5,450.00	0.000	0.000
5,450.25	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	3.871	3.871
5,452.00	51.179	51.179
5,452.50	105.737	105.737
5,453.00	174.956	174.956

Structure #54 (Null)

WS1-1

Structure #64 (Riprap Channel)

Ramp Ditch 1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	82.36 cfs	
Depth:	0.64 ft	1.64 ft
Top Width:	14.54 ft	18.54 ft
Velocity*:		
X-Section Area:	8.43 sq ft	
Hydraulic Radius:	0.568 ft	
Froude Number*:		
Manning's n*:		
Dmin:	3.00 in	
D50:	9.00 in	
Dmax:	11.25 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #29 (Null)

NNSWS06B (Drop Structure)

Structure #20 (Null)

NN S02 & NN S01

Structure #21 (Null)

NNS03 (NN Imp),04,05

Structure #26 (Pond)

Oultet of NN S03 Impoundment Area

Pond Inputs:

Initial Pool Elev:	5,441.01 ft
Initial Pool:	0.00 ac-ft

Pond Results:

Peak Elevation:	5,448.53 ft
Dewater Time:	0.80 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,441.00	0.000	0.000	0.000	
5,441.01	0.011	0.000	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,442.00	1.075	0.394	0.001		
5,443.00	2.094	1.951	0.001		
5,444.00	2.823	4.400	0.001		
5,445.00	4.127	7.855	0.001		
5,446.00	5.827	12.807	0.001		
5,447.00	7.996	19.690	55.000	15.00	
5,448.00	10.478	28.899	300.000	2.80	
5,448.48	12.103	34.314	574.837	0.95	
5,448.53	12.128	35.015	606.129	0.45	Peak Stage
5,449.00	13.565	40.984	872.600		
5,450.00	16.428	55.958	1,000.000		

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,441.00	0.000	0.000
5,441.01	0.000	0.000
5,442.00	0.001	0.001
5,443.00	0.001	0.001
5,444.00	0.001	0.001
5,445.00	0.001	0.001
5,446.00	0.001	0.001
5,447.00	55.000	55.000
5,448.00	300.000	300.000
5,448.48	574.837	574.837
5,449.00	872.600	872.600
5,450.00	1,000.000	1,000.000

Structure #28 (Null)

NNSWS06A (Drop Structure)

Structure #51 (Pond)

TDS7TDS & Berm (CB2-2)

Pond Inputs:

Initial Pool Elev:	5,477.00 ft
Initial Pool:	0.49 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,477.00	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,477.23 ft
Dewater Time:	0.21 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,474.00	0.057	0.000	0.000		
5,474.01	0.058	0.001	0.000		
5,474.20	0.068	0.013	0.000		
5,474.50	0.086	0.036	0.000		
5,475.00	0.118	0.086	0.000		
5,475.50	0.156	0.155	0.000		
5,476.00	0.200	0.243	0.000		
5,476.50	0.243	0.354	0.000		
5,477.00	0.291	0.487	0.000		Spillway #1
5,477.23	0.317	0.562	1.367	4.95	Peak Stage
5,477.50	0.343	0.646	2.913		
5,478.00	0.400	0.832	39.083		
5,478.50	0.446	1.043	81.546		
5,479.00	0.495	1.278	136.186		
5,479.50	0.546	1.538	202.723		
5,480.00	0.600	1.825	281.166		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,474.00	0.000	0.000
5,474.01	0.000	0.000
5,474.20	0.000	0.000
5,474.50	0.000	0.000
5,475.00	0.000	0.000
5,475.50	0.000	0.000
5,476.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.50	0.000	0.000
5,477.00	0.000	0.000
5,477.50	2.913	2.913
5,478.00	39.083	39.083
5,478.50	81.546	81.546
5,479.00	136.186	136.186
5,479.50	202.723	202.723
5,480.00	281.166	281.166

Structure #52 (Culvert)

CP101 & Material Stockpile 2

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.00	0.0240	1.00	0.50	0.90

Culvert Results:

Design Discharge = 1.33 cfs

Minimum pipe diameter: 1 - 12 inch pipe(s) required

Structure #48 (Pond)

TDS6 & CB2-3

Pond Inputs:

Initial Pool Elev:	5,486.00 ft
Initial Pool:	0.88 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,486.00	100.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,486.11 ft
Dewater Time:	0.16 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,482.00	0.100	0.000	0.000		
5,482.50	0.122	0.055	0.000		
5,483.00	0.146	0.122	0.000		
5,483.50	0.172	0.202	0.000		
5,484.00	0.200	0.295	0.000		
5,484.40	0.235	0.382	0.000		
5,484.50	0.244	0.405	0.000		
5,484.70	0.263	0.456	0.000		
5,484.75	0.267	0.469	0.000		
5,485.00	0.291	0.539	0.000		
5,485.50	0.343	0.698	0.000		
5,486.00	0.400	0.883	0.000		Spillway #1
5,486.11	0.406	0.931	2.691	3.95	Peak Stage
5,486.50	0.446	1.095	11.938		
5,487.00	0.495	1.330	23.876		
5,487.50	0.546	1.590	54.567		
5,488.00	0.600	1.877	96.681		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,482.00	0.000	0.000
5,482.50	0.000	0.000
5,483.00	0.000	0.000
5,483.50	0.000	0.000
5,484.00	0.000	0.000
5,484.40	0.000	0.000
5,484.50	0.000	0.000
5,484.70	0.000	0.000
5,484.75	0.000	0.000
5,485.00	0.000	0.000
5,485.50	0.000	0.000
5,486.00	0.000	0.000
5,486.50	11.938	11.938
5,487.00	23.876	23.876
5,487.50	54.567	54.567
5,488.00	96.681	96.681

Structure #49 (Erodible Channel)

MS2-1 & Ditch

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	0.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	19.37 cfs	
Depth:	0.52 ft	1.52 ft
Top Width:	14.08 ft	18.08 ft
Velocity:	2.86 fps	
X-Section Area:	6.77 sq ft	
Hydraulic Radius:	0.473 ft	
Froude Number:	0.73	

Structure #50 (Pond)

MS2-1 Berm and Spillway (CB2-1)

Pond Inputs:

Initial Pool Elev:	5,482.00 ft
Initial Pool:	4.08 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,482.00	15.00	2.00:1	2.00:1	25.00

Pond Results:

Peak Elevation:	5,482.56 ft
Dewater Time:	0.55 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,476.00	0.230	0.000	0.000	
5,476.50	0.268	0.124	0.000	
5,477.00	0.309	0.269	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,477.50	0.353	0.434	0.000		
5,478.00	0.400	0.622	0.000		
5,478.50	0.506	0.848	0.000		
5,479.00	0.625	1.130	0.000		
5,479.50	0.758	1.476	0.000		
5,479.75	0.828	1.674	0.000		
5,480.00	0.900	1.890	0.000		
5,480.20	0.938	2.074	0.000		
5,480.50	0.994	2.363	0.000		
5,480.82	1.056	2.691	0.000		
5,481.00	1.091	2.884	0.000		
5,481.50	1.193	3.455	0.000		
5,482.00	1.300	4.078	0.000		Spillway #1
5,482.50	1.306	4.730	4.829	12.25	
5,482.56	1.307	4.811	12.078	0.95	Peak Stage
5,483.00	1.312	5.384	63.277		
5,483.50	1.318	6.042	129.940		
5,484.00	1.325	6.703	213.757		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.00	0.000	0.000
5,476.50	0.000	0.000
5,477.00	0.000	0.000
5,477.50	0.000	0.000
5,478.00	0.000	0.000
5,478.50	0.000	0.000
5,479.00	0.000	0.000
5,479.50	0.000	0.000
5,479.75	0.000	0.000
5,480.00	0.000	0.000
5,480.20	0.000	0.000
5,480.50	0.000	0.000
5,480.82	0.000	0.000
5,481.00	0.000	0.000
5,481.50	0.000	0.000
5,482.00	0.000	0.000
5,482.50	4.829	4.829

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,483.00	63.277	63.277
5,483.50	129.940	129.940
5,484.00	213.757	213.757

Structure #47 (Erodible Channel)

WS2-1 & DD2-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.61 cfs	
Depth:	0.41 ft	1.41 ft
Top Width:	13.63 ft	17.63 ft
Velocity:	3.57 fps	
X-Section Area:	5.21 sq ft	
Hydraulic Radius:	0.377 ft	
Froude Number:	1.02	

Structure #53 (Riprap Channel)

Ramp Ditch-2

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
6.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	20.62 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	0.32 ft	1.32 ft
Top Width:	7.28 ft	11.28 ft
Velocity*:		
X-Section Area:	2.12 sq ft	
Hydraulic Radius:	0.286 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #43 (Null)

TDS8

Structure #44 (Pond)

CB3-2

Pond Inputs:

Initial Pool Elev:	5,470.00 ft
Initial Pool:	0.52 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,470.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,470.20 ft
Dewater Time:	0.18 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,468.00	0.250	0.000	0.000	
5,468.50	0.256	0.126	0.000	
5,468.70	0.258	0.178	0.000	
5,468.80	0.260	0.204	0.000	
5,469.00	0.262	0.256	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,469.20	0.264	0.309	0.000		
5,469.31	0.266	0.338	0.000		
5,469.50	0.268	0.388	0.000		
5,470.00	0.274	0.524	0.000		Spillway #1
5,470.20	0.277	0.579	1.545	4.30	Peak Stage
5,470.50	0.280	0.663	3.871		
5,471.00	0.287	0.804	51.179		
5,471.50	0.293	0.950	105.737		
5,472.00	0.300	1.098	174.956		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,468.00	0.000	0.000
5,468.50	0.000	0.000
5,468.70	0.000	0.000
5,468.80	0.000	0.000
5,469.00	0.000	0.000
5,469.20	0.000	0.000
5,469.31	0.000	0.000
5,469.50	0.000	0.000
5,470.00	0.000	0.000
5,470.50	3.871	3.871
5,471.00	51.179	51.179
5,471.50	105.737	105.737
5,472.00	174.956	174.956

Structure #45 (Erodible Channel)

DD3-3

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.55 cfs	
Depth:	0.45 ft	1.45 ft
Top Width:	2.71 ft	8.71 ft
Velocity:	2.52 fps	
X-Section Area:	0.61 sq ft	
Hydraulic Radius:	0.215 ft	
Froude Number:	0.93	

Structure #40 (Null)

MS3-1

Structure #41 (Pond)

CB3-1

Pond Inputs:

Initial Pool Elev:	5,466.60 ft
Initial Pool:	1.25 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,466.80 ft
Dewater Time:	0.17 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,464.00	0.450	0.000	0.000	
5,464.10	0.452	0.045	0.000	
5,464.20	0.455	0.091	0.000	
5,464.50	0.462	0.228	0.000	
5,465.00	0.474	0.462	0.000	
5,465.50	0.486	0.702	0.000	
5,465.65	0.490	0.775	0.000	
5,466.00	0.499	0.948	0.000	
5,466.50	0.511	1.201	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,466.60	0.514	1.252	0.000		Spillway #1
5,466.80	0.519	1.358	7.363	4.20	Peak Stage
5,467.00	0.524	1.460	14.423		
5,467.50	0.537	1.725	32.456		
5,468.00	0.550	1.997	72.062		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,464.00	0.000	0.000
5,464.10	0.000	0.000
5,464.20	0.000	0.000
5,464.50	0.000	0.000
5,465.00	0.000	0.000
5,465.50	0.000	0.000
5,465.65	0.000	0.000
5,466.00	0.000	0.000
5,466.50	0.000	0.000
5,466.60	0.000	0.000
5,467.00	14.423	14.423
5,467.50	32.456	32.456
5,468.00	72.062	72.062

Structure #38 (Null)

WS3-1

Structure #39 (Erodible Channel)

DD3-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.4	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	32.98 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	0.62 ft	1.62 ft
Top Width:	14.50 ft	18.50 ft
Velocity:	3.99 fps	
X-Section Area:	8.27 sq ft	
Hydraulic Radius:	0.559 ft	
Froude Number:	0.93	

Structure #42 (Erodible Channel)

DD3-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	39.79 cfs	
Depth:	0.68 ft	1.68 ft
Top Width:	14.73 ft	18.73 ft
Velocity:	4.36 fps	
X-Section Area:	9.13 sq ft	
Hydraulic Radius:	0.606 ft	
Froude Number:	0.98	

Structure #46 (Riprap Channel)

DD3-4 Ramp Ditch 3

Triangular Riprap Channel Inputs:

Material: Riprap

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	41.28 cfs	
Depth:	1.67 ft	2.67 ft
Top Width:	6.69 ft	10.69 ft
Velocity:	7.38 fps	
X-Section Area:	5.59 sq ft	
Hydraulic Radius:	0.748 ft	
Froude Number:	1.42	
Manning's n:	0.0440	
Dmin:	3.00 in	
D50:	6.00 in	
Dmax:	9.00 in	

Structure #33 (Null)

MS4-1 & WS4-1

Structure #34 (Pond)

CB4-1

Pond Inputs:

Initial Pool Elev:	5,466.60 ft
Initial Pool:	1.53 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,466.81 ft
Dewater Time:	0.17 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,462.00	0.200	0.000	0.000	
5,462.01	0.200	0.002	0.000	
5,462.50	0.225	0.106	0.000	
5,463.00	0.252	0.226	0.000	
5,463.50	0.280	0.359	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,464.00	0.310	0.506	0.000		
5,464.50	0.341	0.669	0.000		
5,464.90	0.367	0.810	0.000		
5,465.00	0.373	0.847	0.000		
5,465.50	0.407	1.042	0.000		
5,466.00	0.443	1.255	0.000		
5,466.50	0.480	1.485	0.000		
5,466.60	0.487	1.534	0.000		Spillway #1
5,466.81	0.503	1.639	9.883	4.05	Peak Stage
5,467.00	0.518	1.735	18.923		
5,467.50	0.558	2.004	42.582		
5,468.00	0.600	2.293	93.619		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,462.00	0.000	0.000
5,462.01	0.000	0.000
5,462.50	0.000	0.000
5,463.00	0.000	0.000
5,463.50	0.000	0.000
5,464.00	0.000	0.000
5,464.50	0.000	0.000
5,464.90	0.000	0.000
5,465.00	0.000	0.000
5,465.50	0.000	0.000
5,466.00	0.000	0.000
5,466.50	0.000	0.000
5,466.60	0.000	0.000
5,467.00	18.923	18.923
5,467.50	42.582	42.582
5,468.00	93.619	93.619

Structure #35 (Erodible Channel)

DD4-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	0.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	9.88 cfs	
Depth:	1.18 ft	2.18 ft
Top Width:	7.06 ft	13.06 ft
Velocity:	2.38 fps	
X-Section Area:	4.15 sq ft	
Hydraulic Radius:	0.558 ft	
Froude Number:	0.55	

Structure #36 (Culvert)

CP102

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.50	0.0240	2.00	1.50	0.90

Culvert Results:

Design Discharge = 9.88 cfs

Minimum pipe diameter: 1 - 24 inch pipe(s) required

Structure #37 (Riprap Channel)

DD4-2 Ramp Ditch 4

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
6.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	9.88 cfs	
Depth:	0.33 ft	1.33 ft

	w/o Freeboard	w/ Freeboard
Top Width:	7.30 ft	11.30 ft
Velocity:	4.55 fps	
X-Section Area:	2.17 sq ft	
Hydraulic Radius:	0.291 ft	
Froude Number:	1.47	
Manning's n:	0.0380	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Structure #30 (Null)

WS5-1

Structure #31 (Erodible Channel)

DD5-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	69.69 cfs	
Depth:	1.07 ft	2.07 ft
Top Width:	16.26 ft	20.26 ft
Velocity:	4.63 fps	
X-Section Area:	15.07 sq ft	
Hydraulic Radius:	0.899 ft	
Froude Number:	0.85	

Structure #32 (Riprap Channel)

Ramp Ditch 5

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	69.69 cfs	
Depth:	0.79 ft	1.79 ft
Top Width:	15.14 ft	19.14 ft
Velocity:	6.53 fps	
X-Section Area:	10.67 sq ft	
Hydraulic Radius:	0.688 ft	
Froude Number:	1.37	
Manning's n:	0.0470	
Dmin:	3.00 in	
D50:	6.00 in	
Dmax:	9.00 in	

Structure #18 (Erodible Channel)

Upper East Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
14.00	2.0:1	2.0:1	0.6	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	105.10 cfs	
Depth:	1.57 ft	
Top Width:	20.30 ft	
Velocity:	3.89 fps	
X-Section Area:	26.99 sq ft	
Hydraulic Radius:	1.283 ft	
Froude Number:	0.59	

Structure #19 (Erodible Channel)

Lower E Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
14.00	2.0:1	2.0:1	0.3	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	181.83 cfs	
Depth:	2.60 ft	
Top Width:	24.41 ft	
Velocity:	3.64 fps	
X-Section Area:	49.97 sq ft	
Hydraulic Radius:	1.949 ft	
Froude Number:	0.45	

Structure #3 (Null)

Structure #4 (Null)

Structure #1 (Null)

Structure #2 (Null)

Structure #5 (Null)

Structure #6 (Null)

EAST LEASE BNDY

Structure #11 (Pond)

Sta:118+00 - U Shaped Impoundment

Pond Inputs:

Initial Pool Elev:	5,430.01 ft
Initial Pool:	0.00 ac-ft

Pond Results:

Peak Elevation:	5,447.57 ft
Dewater Time:	1.44 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,430.00	0.000	0.000	0.000		
5,430.01	0.002	0.000	0.000		
5,431.00	0.225	0.082	3.900	1.70	
5,432.00	0.822	0.575	8.230	1.05	
5,433.00	2.809	2.292	17.280	1.70	
5,434.00	6.235	6.701	31.060	2.25	
5,435.00	11.008	15.210	45.120	2.75	
5,436.00	16.934	29.075	65.530	3.05	
5,437.00	24.132	49.503	92.860	3.15	
5,438.00	29.977	76.504	129.180	3.00	
5,439.00	36.455	109.667	168.090	2.70	
5,440.00	39.413	147.592	209.680	2.45	
5,441.00	42.486	188.531	263.440	2.10	
5,442.00	43.250	231.399	329.180	1.75	
5,443.00	44.020	275.033	421.610	1.45	
5,444.00	44.637	319.361	515.750	1.20	
5,445.00	45.259	364.309	594.490	1.10	
5,446.00	46.060	409.968	807.140	1.00	
5,447.00	46.869	456.432	1,021.210	0.95	
5,447.57	47.659	483.387	1,104.498	1.10	Peak Stage
5,448.00	48.100	503.915	1,167.930		
5,449.00	49.346	552.637	1,720.410		
5,450.00	51.291	602.952	2,309.040		
5,451.00	53.274	655.232	2,928.330		
5,452.00	56.392	710.057	3,767.860		
5,452.50	57.976	738.649	4,223.680		
5,453.00	59.573	768.035	4,693.290		
5,454.00	65.520	830.558	5,723.400		
5,455.00	71.750	899.169	6,850.570		

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,430.00	0.000	0.000
5,430.01	0.000	0.000
5,431.00	3.900	3.900
5,432.00	8.230	8.230
5,433.00	17.280	17.280

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,434.00	31.060	31.060
5,435.00	45.120	45.120
5,436.00	65.530	65.530
5,437.00	92.860	92.860
5,438.00	129.180	129.180
5,439.00	168.090	168.090
5,440.00	209.680	209.680
5,441.00	263.440	263.440
5,442.00	329.180	329.180
5,443.00	421.610	421.610
5,444.00	515.750	515.750
5,445.00	594.490	594.490
5,446.00	807.140	807.140
5,447.00	1,021.210	1,021.210
5,448.00	1,167.930	1,167.930
5,449.00	1,720.410	1,720.410
5,450.00	2,309.040	2,309.040
5,451.00	2,928.330	2,928.330
5,452.00	3,767.860	3,767.860
5,452.50	4,223.680	4,223.680
5,453.00	4,693.290	4,693.290
5,454.00	5,723.400	5,723.400
5,455.00	6,850.570	6,850.570

Structure #17 (Erodible Channel)

Pinabete Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
45.00	2.0:1	2.0:1	0.2	0.0400		50.00		5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	1,104.30 cfs	
Depth:	4.84 ft	7.26 ft
Top Width:	64.35 ft	74.02 ft
Velocity:	4.18 fps	
X-Section Area:	264.45 sq ft	

	w/o Freeboard	w/ Freeboard
Hydraulic Radius:	3.969 ft	
Froude Number:	0.36	

Structure #27 (Null)

End of P Diversion, NNSWS06C,S7SW1

Structure #22 (Null)

NN SO4 (SWS07)

Structure #23 (Null)

NN S05 (SWS08)

Structure #24 (Null)

NN S06 (SWS09,10,11,12,13,14)

Structure #25 (Null)

NN S07 (SWS15,16,17,18,19)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#65	1	22.110	0.202	0.000	0.000	89.000	M	20.41	0.995
	Σ	**22.110**						**20.41**	**0.995**
#61	1	34.787	0.134	0.000	0.000	86.200	M	28.43	1.275
	Σ	**34.787**						**28.43**	**1.275**
#59	1	41.030	0.320	0.000	0.000	86.200	M	25.94	1.479
	Σ	**41.030**						**25.94**	**1.479**
#60	Σ	**41.030**						**25.94**	**1.479**
#62	Σ	**75.817**						**52.41**	**2.753**
#63	Σ	**75.817**						**50.21**	**2.753**
#57	1	4.740	0.080	0.000	0.000	81.500	M	4.92	0.143
	Σ	**4.740**						**4.92**	**0.143**
#58	Σ	**4.740**						**4.92**	**0.143**
#55	1	4.870	0.122	0.000	0.000	89.000	M	7.80	0.274
	Σ	**4.870**						**7.80**	**0.274**
#56	Σ	**4.870**						**7.80**	**0.274**
#54	1	42.850	0.194	0.000	0.000	86.200	M	33.09	1.551
	Σ	**42.850**						**33.09**	**1.551**
#64	Σ	**128.277**						**82.36**	**4.721**
#29	1	286.550	0.248	0.000	0.000	86.200	M	201.95	10.383
	Σ	**286.550**						**201.95**	**10.383**
#20	1	856.430	1.610	0.000	0.000	85.700	M	176.69	29.508
	2	999.370	1.260	0.814	0.291	81.700	M	172.82	24.462
	Σ	**1,855.800**						**297.11**	**53.970**
#21	1	925.920	1.675	0.409	0.297	88.800	M	241.07	40.887
	2	1,019.220	1.106	0.193	0.261	87.000	M	315.09	39.029
	3	425.160	0.766	0.000	0.000	87.400	M	177.01	16.824
	Σ	**4,226.100**						**643.10**	**150.711**
#26	1	13.260	0.076	0.000	0.000	93.000	M	25.54	1.014
	Σ	**4,239.359**						**643.78**	**151.725**
#28	1	67.100	0.380	0.000	0.000	86.200	M	38.99	2.410
	Σ	**4,306.459**						**608.48**	**141.321**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#51	1	4.820	0.055	0.000	0.000	81.500	M	5.00	0.145
	Σ	**4.820**						**5.00**	**0.145**
#52	1	0.200	0.004	0.000	0.000	89.000	M	0.32	0.010
	Σ	**5.020**						**1.33**	**0.155**
#48	1	8.810	0.301	0.000	0.000	81.500	M	3.87	0.213
	Σ	**8.810**						**3.87**	**0.213**
#49	1	37.570	0.681	0.000	0.000	89.000	M	19.32	1.687
	Σ	**46.380**						**19.37**	**1.899**
#50	Σ	**46.380**						**19.37**	**1.899**
#47	1	29.270	0.146	0.000	0.000	82.900	M	18.61	0.813
	Σ	**29.270**						**18.61**	**0.813**
#53	Σ	**80.670**						**20.62**	**2.868**
#43	1	6.207	0.137	0.000	0.000	81.500	M	3.52	0.152
	Σ	**6.207**						**3.52**	**0.152**
#44	Σ	**6.207**						**3.52**	**0.152**
#45	Σ	**6.207**						**1.55**	**0.152**
#40	1	12.150	0.354	0.000	0.000	89.000	M	9.18	0.548
	Σ	**12.150**						**9.18**	**0.548**
#41	Σ	**12.150**						**9.18**	**0.548**
#38	1	66.380	0.302	0.000	0.000	82.900	M	32.98	1.813
	Σ	**66.380**						**32.98**	**1.813**
#39	Σ	**66.380**						**32.98**	**1.813**
#42	Σ	**78.530**						**39.79**	**2.361**
#46	Σ	**84.737**						**41.28**	**2.513**
#33	1	14.130	0.291	0.000	0.000	89.000	M	11.61	0.636
	Σ	**14.130**						**11.61**	**0.636**
#34	Σ	**14.130**						**11.61**	**0.636**
#35	Σ	**14.130**						**9.88**	**0.636**
#36	Σ	**14.130**						**9.88**	**0.636**
#37	Σ	**14.130**						**9.88**	**0.636**
#30	1	282.150	0.909	0.000	0.000	82.900	M	69.69	7.681
	Σ	**282.150**						**69.69**	**7.681**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#31	**Σ**	**282.150**						**69.69**	**7.681**
#32	**Σ**	**282.150**						**69.69**	**7.681**
#18	1	1,352.640	1.370	0.000	0.000	75.000	M	104.80	16.940
	2	148.000	1.315	1.026	0.249	76.000	M	13.40	2.071
	Σ	**1,500.640**						**105.10**	**19.011**
#19	1	418.020	1.293	0.000	0.000	82.900	M	79.41	11.370
	Σ	**1,918.660**						**181.83**	**30.381**
#3	1	791.300	1.145	1.181	0.350	80.800	M	134.66	17.850
	2	1,079.100	0.915	0.596	0.351	80.900	M	218.44	24.576
	3	450.300	0.571	0.319	0.355	81.300	M	131.92	10.645
	4	742.600	0.625	0.000	0.000	78.500	M	152.12	13.449
	5	915.400	1.119	0.000	0.000	78.800	M	128.87	17.082
	Σ	**3,978.700**						**435.68**	**83.601**
#4	1	546.400	0.726	1.710	0.319	81.700	M	141.00	13.383
	2	441.200	0.503	1.429	0.318	86.000	M	215.25	15.606
	3	889.400	0.815	0.998	0.318	82.100	M	219.91	22.567
	4	1,339.100	0.919	0.000	0.000	84.000	M	363.71	40.063
	Σ	**7,194.800**						**626.52**	**175.220**
#1	1	1,242.300	1.349	1.359	0.354	80.800	M	186.69	28.017
	2	1,662.000	1.465	0.865	0.359	80.300	M	222.90	35.782
	3	1,434.000	1.573	1.257	0.357	81.100	M	197.09	33.242
	4	842.700	1.102	0.977	0.364	81.000	M	150.51	19.360
	5	676.100	1.067	1.113	0.365	81.600	M	131.15	16.402
	6	1,223.200	0.778	0.596	0.352	81.800	M	303.53	30.224
	7	743.100	0.745	0.530	0.354	83.600	M	225.80	21.489
	8	654.500	0.801	0.000	0.000	92.200	M	390.52	37.550
	Σ	**8,477.899**						**964.91**	**222.066**
#2	1	609.500	0.668	1.219	0.340	85.700	M	241.10	21.031
	2	537.100	0.610	1.436	0.329	91.600	M	366.65	29.470
	3	455.000	0.546	1.288	0.324	82.000	M	147.04	11.447
	4	627.000	0.634	0.852	0.324	87.900	M	309.02	25.806
	5	653.100	0.452	0.453	0.315	91.200	M	516.56	34.757
	6	957.200	0.984	0.000	0.000	89.600	M	400.66	44.997
	Σ	**12,316.800**						**1,115.80**	**389.574**
#5	1	763.100	0.682	3.507	0.293	84.100	M	258.17	23.031
	2	983.300	1.117	2.231	0.289	89.200	M	362.81	44.798
	3	1,022.000	0.996	1.587	0.291	92.000	M	513.94	57.762
	4	688.700	1.908	1.255	0.291	80.800	M	78.92	15.530

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
	5	754.300	2.307	1.084	0.287	86.200	M	121.40	27.069
	6	628.400	0.538	0.595	0.301	93.000	M	516.54	38.340
	7	654.500	0.560	0.000	0.000	91.500	M	467.78	35.634
	Σ	**25,005.900**						**1,715.48**	**806.959**
#6	1	901.400	1.151	1.896	0.315	81.100	M	157.41	20.899
	2	1,011.200	1.871	0.166	0.287	83.500	M	152.07	28.970
	3	1,124.300	1.126	0.000	0.000	92.800	M	550.85	67.486
	Σ	**28,042.800**						**1,702.17**	**924.314**
#11	1	53.960	0.000	0.000	0.000	91.000	M	95.19	3.543
	Σ	**30,311.700**						**1,703.88**	**966.555**
#17	Σ	**30,477.110**						**1,104.30**	**971.937**
#27	1	43.270	0.441	0.000	0.000	86.200	M	23.20	1.556
	Σ	**35,263.770**						**1,102.60**	**1,130.911**
#22	1	519.990	0.565	0.000	0.000	88.400	M	287.34	22.272
	Σ	**35,783.760**						**1,102.33**	**1,153.183**
#23	1	233.290	0.469	0.000	0.000	87.900	M	138.71	9.614
	Σ	**36,017.050**						**1,102.18**	**1,162.797**
#24	1	126.980	0.164	0.545	0.308	86.900	M	109.06	4.924
	2	235.630	0.327	0.427	0.341	86.700	M	153.72	8.845
	3	258.380	0.416	0.365	0.294	88.300	M	170.13	11.016
	4	180.930	0.449	0.176	0.301	86.700	M	99.97	6.771
	5	189.850	0.326	0.146	0.330	86.800	M	125.06	7.183
	6	172.360	0.753	0.000	0.000	88.300	M	78.25	7.324
	Σ	**37,181.180**						**1,101.36**	**1,208.860**
#25	1	91.450	0.220	0.854	0.310	86.800	M	70.54	3.470
	2	286.490	0.566	0.642	0.312	87.100	M	142.26	11.068
	3	75.280	0.179	0.610	0.308	86.800	M	62.64	2.885
	4	128.700	0.157	0.270	0.325	86.800	M	109.77	4.951
	5	67.060	0.333	0.000	0.000	82.000	M	29.30	1.695
	Σ	**37,830.160**						**1,100.11**	**1,232.928**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.99	22.00	736.00	1.720	0.118

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.63	66.00	10,511.22	2.370	1.231
#1	**1**	**Time of Concentration:**					**1.349**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	6.24	30.00	481.00	2.490	0.053
		8. Large gullies, diversions, and low flowing streams	3.34	406.00	12,141.00	5.480	0.615
#2	**1**	**Time of Concentration:**					**0.668**
#2	2	5. Nearly bare and untilled, and alluvial valley fans	3.16	30.00	950.00	1.770	0.149
		8. Large gullies, diversions, and low flowing streams	4.22	432.00	10,229.00	6.160	0.461
#2	**2**	**Time of Concentration:**					**0.610**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	2.65	10.00	378.00	1.620	0.064
		8. Large gullies, diversions, and low flowing streams	2.72	234.00	8,592.00	4.950	0.482
#2	**3**	**Time of Concentration:**					**0.546**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	3.07	25.00	815.00	1.750	0.129
		8. Large gullies, diversions, and low flowing streams	3.32	330.00	9,931.00	5.460	0.505
#2	**4**	**Time of Concentration:**					**0.634**
#2	5	5. Nearly bare and untilled, and alluvial valley fans	7.45	45.00	604.00	2.720	0.061
		8. Large gullies, diversions, and low flowing streams	3.78	310.00	8,210.00	5.820	0.391
#2	**5**	**Time of Concentration:**					**0.452**
#2	6	5. Nearly bare and untilled, and alluvial valley fans	9.10	80.00	879.00	3.010	0.081
		8. Large gullies, diversions, and low flowing streams	2.32	344.00	14,831.00	4.560	0.903
#2	**6**	**Time of Concentration:**					**0.984**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	1.29	15.00	1,163.00	1.130	0.285
		8. Large gullies, diversions, and low flowing streams	2.37	338.00	14,280.00	4.610	0.860
#3	**1**	**Time of Concentration:**					**1.145**
#3	2	5. Nearly bare and untilled, and alluvial valley fans	3.04	33.00	1,087.00	1.740	0.173
		8. Large gullies, diversions, and low flowing streams	2.06	238.00	11,527.00	4.310	0.742
#3	**2**	**Time of Concentration:**					**0.915**
#3	3	5. Nearly bare and untilled, and alluvial valley fans	5.02	45.00	897.00	2.230	0.111
		8. Large gullies, diversions, and low flowing streams	3.09	270.00	8,741.00	5.270	0.460
#3	**3**	**Time of Concentration:**					**0.571**
#3	4	5. Nearly bare and untilled, and alluvial valley fans	7.41	28.00	378.00	2.720	0.038

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	3.43	402.00	11,736.00	5.550	0.587
#3	**4**	**Time of Concentration:**					**0.625**
#3	5	5. Nearly bare and untilled, and alluvial valley fans	3.39	30.00	885.00	1.840	0.133
		8. Large gullies, diversions, and low flowing streams	2.58	442.00	17,121.00	4.820	0.986
#3	**5**	**Time of Concentration:**					**1.119**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	3.59	62.00	1,729.00	1.890	0.254
		8. Large gullies, diversions, and low flowing streams	2.09	154.00	7,372.00	4.330	0.472
#4	**1**	**Time of Concentration:**					**0.726**
#4	2	5. Nearly bare and untilled, and alluvial valley fans	6.83	25.00	366.00	2.610	0.038
		8. Large gullies, diversions, and low flowing streams	2.36	182.00	7,708.00	4.600	0.465
#4	**2**	**Time of Concentration:**					**0.503**
#4	3	5. Nearly bare and untilled, and alluvial valley fans	19.03	47.00	247.00	4.360	0.015
		8. Large gullies, diversions, and low flowing streams	2.13	268.00	12,586.00	4.370	0.800
#4	**3**	**Time of Concentration:**					**0.815**
#4	4	5. Nearly bare and untilled, and alluvial valley fans	14.08	50.00	355.00	3.750	0.026
		8. Large gullies, diversions, and low flowing streams	2.46	372.00	15,119.00	4.700	0.893
#4	**4**	**Time of Concentration:**					**0.919**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	12.55	65.00	518.00	3.540	0.040
		8. Large gullies, diversions, and low flowing streams	1.92	184.00	9,592.00	4.150	0.642
#5	**1**	**Time of Concentration:**					**0.682**
#5	2	5. Nearly bare and untilled, and alluvial valley fans	5.10	30.00	588.00	2.250	0.072
		8. Large gullies, diversions, and low flowing streams	1.77	266.00	15,016.00	3.990	1.045
#5	**2**	**Time of Concentration:**					**1.117**
#5	3	5. Nearly bare and untilled, and alluvial valley fans	1.90	20.00	1,050.00	1.380	0.211
		8. Large gullies, diversions, and low flowing streams	2.19	274.00	12,532.00	4.430	0.785
#5	**3**	**Time of Concentration:**					**0.996**
#5	4	5. Nearly bare and untilled, and alluvial valley fans	2.78	32.00	1,152.00	1.660	0.192
		8. Large gullies, diversions, and low flowing streams	0.99	182.00	18,415.00	2.980	1.716
#5	**4**	**Time of Concentration:**					**1.908**
#5	5	5. Nearly bare and untilled, and alluvial valley fans	2.52	23.00	911.00	1.580	0.160

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	1.07	256.00	23,965.00	3.100	2.147
#5	**5**	**Time of Concentration:**					**2.307**
#5	6	5. Nearly bare and untilled, and alluvial valley fans	6.36	25.00	393.00	2.520	0.043
		8. Large gullies, diversions, and low flowing streams	2.39	198.00	8,272.00	4.640	0.495
#5	**6**	**Time of Concentration:**					**0.538**
#5	7	5. Nearly bare and untilled, and alluvial valley fans	9.66	28.00	290.00	3.100	0.025
		8. Large gullies, diversions, and low flowing streams	2.12	179.00	8,427.00	4.370	0.535
#5	**7**	**Time of Concentration:**					**0.560**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	31.83	120.00	377.00	5.640	0.018
		8. Large gullies, diversions, and low flowing streams	1.38	198.00	14,361.00	3.520	1.133
#6	**1**	**Time of Concentration:**					**1.151**
#6	2	5. Nearly bare and untilled, and alluvial valley fans	4.25	40.00	941.00	2.060	0.126
		8. Large gullies, diversions, and low flowing streams	0.96	176.00	18,407.00	2.930	1.745
#6	**2**	**Time of Concentration:**					**1.871**
#6	3	5. Nearly bare and untilled, and alluvial valley fans	4.35	25.00	575.00	2.080	0.076
		8. Large gullies, diversions, and low flowing streams	1.57	224.00	14,223.00	3.760	1.050
#6	**3**	**Time of Concentration:**					**1.126**
#26	1	8. Large gullies, diversions, and low flowing streams	2.35	30.00	1,274.04	4.600	0.076
#26	**1**	**Time of Concentration:**					**0.076**
#27	1	5. Nearly bare and untilled, and alluvial valley fans	2.60	15.60	600.00	1.610	0.103
		8. Large gullies, diversions, and low flowing streams	0.92	32.00	3,493.83	2.870	0.338
#27	**1**	**Time of Concentration:**					**0.441**
#28	1	8. Large gullies, diversions, and low flowing streams	2.92	80.00	2,740.30	5.120	0.148
		8. Large gullies, diversions, and low flowing streams	2.60	105.00	4,042.56	4.830	0.232
#28	**1**	**Time of Concentration:**					**0.380**
#29	1	8. Large gullies, diversions, and low flowing streams	3.69	120.00	3,255.51	5.750	0.157
		8. Large gullies, diversions, and low flowing streams	0.87	8.00	921.20	2.790	0.091
#29	**1**	**Time of Concentration:**					**0.248**
#30	1	5. Nearly bare and untilled, and alluvial valley fans	2.56	42.03	1,642.00	1.590	0.286
		5. Nearly bare and untilled, and alluvial valley fans	1.42	17.99	1,267.00	1.190	0.295

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.94	18.00	1,915.00	2.900	0.183
		8. Large gullies, diversions, and low flowing streams	0.25	1.95	784.00	1.500	0.145
#30	**1**	**Time of Concentration:**					**0.909**
#33	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	9.39	469.50	1.410	0.092
		8. Large gullies, diversions, and low flowing streams	0.50	7.50	1,500.00	2.120	0.196
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#33	**1**	**Time of Concentration:**					**0.291**
#38	1	5. Nearly bare and untilled, and alluvial valley fans	2.50	2.00	80.00	1.580	0.014
		7. Paved area and small upland gullies	4.80	16.03	334.00	4.410	0.021
		7. Paved area and small upland gullies	1.80	27.75	1,542.00	2.700	0.158
		8. Large gullies, diversions, and low flowing streams	1.42	19.99	1,408.00	3.570	0.109
#38	**1**	**Time of Concentration:**					**0.302**
#40	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	13.29	664.53	1.410	0.130
		8. Large gullies, diversions, and low flowing streams	0.30	3.93	1,310.00	1.640	0.221
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#40	**1**	**Time of Concentration:**					**0.354**
#43	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		8. Large gullies, diversions, and low flowing streams	1.50	15.00	1,000.00	3.670	0.075
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#43	**1**	**Time of Concentration:**					**0.137**
#47	1	5. Nearly bare and untilled, and alluvial valley fans	2.33	6.99	300.00	1.520	0.054
		8. Large gullies, diversions, and low flowing streams	3.70	37.00	1,000.00	5.770	0.048
		8. Large gullies, diversions, and low flowing streams	1.87	12.28	657.00	4.100	0.044
#47	**1**	**Time of Concentration:**					**0.146**
#48	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	0.15	1.50	1,000.00	1.160	0.239
#48	**1**	**Time of Concentration:**					**0.301**
#49	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	20.00	1,000.00	1.410	0.197

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.18	4.00	2,201.43	1.270	0.481
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#49	**1**	**Time of Concentration:**					**0.681**
#51	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		8. Large gullies, diversions, and low flowing streams	2.86	12.01	419.94	5.070	0.023
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#51	**1**	**Time of Concentration:**					**0.055**
#54	1	5. Nearly bare and untilled, and alluvial valley fans	2.03	14.00	690.00	1.420	0.134
		8. Large gullies, diversions, and low flowing streams	2.11	20.00	950.00	4.350	0.060
#54	**1**	**Time of Concentration:**					**0.194**
#55	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	2.48	25.54	1,030.00	4.720	0.060
#55	**1**	**Time of Concentration:**					**0.122**
#57	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	1.33	7.98	600.00	3.450	0.048
#57	**1**	**Time of Concentration:**					**0.080**
#59	1	5. Nearly bare and untilled, and alluvial valley fans	0.81	5.00	620.00	0.890	0.193
		8. Large gullies, diversions, and low flowing streams	1.33	21.00	1,580.00	3.450	0.127
#59	**1**	**Time of Concentration:**					**0.320**
#61	1	5. Nearly bare and untilled, and alluvial valley fans	2.71	16.00	590.01	1.640	0.099
		8. Large gullies, diversions, and low flowing streams	1.89	10.00	530.02	4.120	0.035
#61	**1**	**Time of Concentration:**					**0.134**
#65	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	15.00	750.00	1.410	0.147
		9. Small streams flowing bankfull	1.46	29.93	2,050.00	10.870	0.052
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#65	**1**	**Time of Concentration:**					**0.202**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.88	378.00	20,112.80	4.110	1.359
#1	**1**	**Muskingum K:**					**1.359**
#2	1	8. Large gullies, diversions, and low flowing streams	1.44	228.00	15,800.00	3.600	1.219
#2	**1**	**Muskingum K:**					**1.219**
#2	2	8. Large gullies, diversions, and low flowing streams	1.19	202.00	16,912.00	3.270	1.436
#2	**2**	**Muskingum K:**					**1.436**
#2	3	8. Large gullies, diversions, and low flowing streams	1.10	160.00	14,568.00	3.140	1.288
#2	**3**	**Muskingum K:**					**1.288**
#2	4	8. Large gullies, diversions, and low flowing streams	1.09	104.00	9,576.00	3.120	0.852
#2	**4**	**Muskingum K:**					**0.852**
#2	5	8. Large gullies, diversions, and low flowing streams	0.93	44.00	4,715.00	2.890	0.453
#2	**5**	**Muskingum K:**					**0.453**
#3	1	8. Large gullies, diversions, and low flowing streams	1.75	294.00	16,845.00	3.960	1.181
#3	**1**	**Muskingum K:**					**1.181**
#3	2	8. Large gullies, diversions, and low flowing streams	1.79	154.00	8,609.00	4.010	0.596
#3	**2**	**Muskingum K:**					**0.596**
#3	3	8. Large gullies, diversions, and low flowing streams	1.93	92.00	4,778.00	4.160	0.319
#3	**3**	**Muskingum K:**					**0.319**
#4	1	8. Large gullies, diversions, and low flowing streams	1.01	186.00	18,477.00	3.000	1.710
#4	**1**	**Muskingum K:**					**1.710**
#4	2	8. Large gullies, diversions, and low flowing streams	0.98	150.00	15,281.00	2.970	1.429
#4	**2**	**Muskingum K:**					**1.429**
#4	3	8. Large gullies, diversions, and low flowing streams	0.98	104.00	10,645.00	2.960	0.998
#4	**3**	**Muskingum K:**					**0.998**
#5	1	8. Large gullies, diversions, and low flowing streams	0.64	195.00	30,309.00	2.400	3.507
#5	**1**	**Muskingum K:**					**3.507**
#5	2	8. Large gullies, diversions, and low flowing streams	0.60	113.00	18,717.00	2.330	2.231
#5	**2**	**Muskingum K:**					**2.231**
#5	3	8. Large gullies, diversions, and low flowing streams	0.63	85.00	13,541.00	2.370	1.587
#5	**3**	**Muskingum K:**					**1.587**
#5	4	8. Large gullies, diversions, and low flowing streams	0.63	67.00	10,710.00	2.370	1.255
#5	**4**	**Muskingum K:**					**1.255**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	5	8. Large gullies, diversions, and low flowing streams	0.59	53.00	8,978.00	2.300	1.084
#5	**5**	**Muskingum K:**					**1.084**
#5	6	8. Large gullies, diversions, and low flowing streams	0.74	41.00	5,528.00	2.580	0.595
#5	**6**	**Muskingum K:**					**0.595**
#6	1	8. Large gullies, diversions, and low flowing streams	0.94	186.00	19,797.00	2.900	1.896
#6	**1**	**Muskingum K:**					**1.896**
#6	2	8. Large gullies, diversions, and low flowing streams	0.58	8.00	1,372.00	2.290	0.166
#6	**2**	**Muskingum K:**					**0.166**
#27	1	8. Large gullies, diversions, and low flowing streams	0.30	16.15	5,384.09	1.640	0.911
#27	**1**	**Muskingum K:**					**0.000**

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Attachment 26.A-D.2.4

PINABETE DIVERSION and EASTERN DIVERSION

1000-Yr 6-Hr Event

Operations - Includes 'U' Storage Area

@ Sta: 118+00, Pinabete Diversion and No Name Impoundment

with Detailed Stormwater Designs

CBEGEJ

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General Information

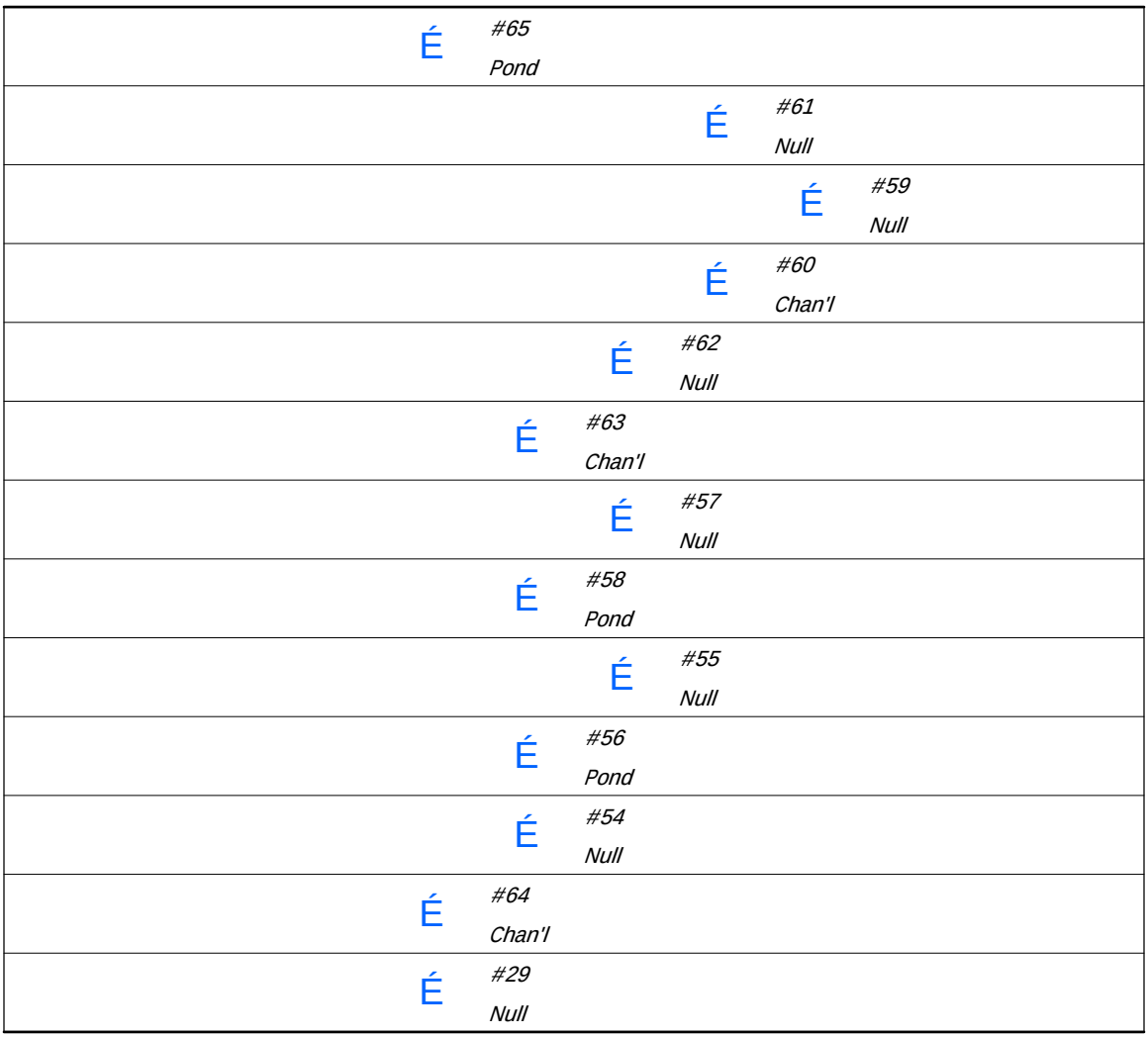
Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	1000 yr - 6 hr
Rainfall Depth:	3.020 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	1.674	0.331	
Null	#2	==>	#5	4.188	0.295	
Null	#3	==>	#4	1.961	0.319	
Null	#4	==>	#5	3.103	0.304	
Null	#5	==>	#6	1.300	0.273	
Null	#6	==>	#11	0.000	0.000	EAST LEASE BNDY
Pond	#11	==>	#17	0.124	0.220	Sta:118+00 - U Shaped Impoundment
Channel	#17	==>	#27	2.321	0.220	Pinabete Diversion
Channel	#18	==>	#19	0.074	0.377	Upper East Diversion
Channel	#19	==>	#11	0.576	0.245	Lower E Diversion
Null	#20	==>	#21	0.656	0.345	NN S02 & NN S01
Null	#21	==>	#26	0.000	0.000	NNS03 (NN Imp),04,05
Null	#22	==>	#23	0.096	0.358	NN SO4 (SWS07)
Null	#23	==>	#24	0.681	0.307	NN S05 (SWS08)
Null	#24	==>	#25	1.027	0.307	NN S06 (SWS09,10,11,12,13,14)
Null	#25	==>	End	0.000	0.000	NN S07 (SWS15,16,17,18,19)
Pond	#26	==>	#28	0.063	0.380	Oultet of NN S03 Impoundment Area
Null	#27	==>	#22	0.250	0.320	End of P Diversion, NNSWS06C,S7SW1
Null	#28	==>	#27	0.241	0.246	NNSWS06A (Drop Structure)
Null	#29	==>	#27	0.205	0.246	NNSWS06B (Drop Structure)
Null	#30	==>	#31	0.000	0.000	WS5-1
Channel	#31	==>	#32	0.000	0.000	DD5-1
Channel	#32	==>	#11	0.000	0.000	Ramp Ditch 5
Null	#33	==>	#34	0.000	0.000	MS4-1 & WS4-1
Pond	#34	==>	#35	0.012	0.335	CB4-1
Channel	#35	==>	#36	0.005	0.357	DD4-1
Culvert	#36	==>	#37	0.000	0.000	CP102
Channel	#37	==>	#11	0.000	0.000	DD4-2 Ramp Ditch 4
Null	#38	==>	#39	0.000	0.000	WS3-1
Channel	#39	==>	#42	0.025	0.306	DD3-1
Null	#40	==>	#41	0.000	0.000	MS3-1
Pond	#41	==>	#42	0.000	0.000	CB3-1
Channel	#42	==>	#46	0.026	0.412	DD3-2
Null	#43	==>	#44	0.000	0.000	TDS8
Pond	#44	==>	#45	0.043	0.318	CB3-2
Channel	#45	==>	#46	0.026	0.412	DD3-3
Channel	#46	==>	#17	0.000	0.000	DD3-4 Ramp Ditch 3
Channel	#47	==>	#53	0.000	0.000	WS2-1 & DD2-1
Pond	#48	==>	#49	0.679	0.173	TDS6 & CB2-3
Channel	#49	==>	#50	0.000	0.000	MS2-1 & Ditch

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#50	==>	#53	0.052	0.406	MS2-1 Berm and Spillway (CB2-1)
Pond	#51	==>	#52	0.067	0.210	TDS7TDS & Berm (CB2-2)
Culvert	#52	==>	#53	0.000	0.000	CP101 & Material Stockpile 2
Channel	#53	==>	#17	0.000	0.000	Ramp Ditch-2
Null	#54	==>	#64	0.026	0.412	WS1-1
Null	#55	==>	#56	0.000	0.000	MS1-1
Pond	#56	==>	#64	0.026	0.412	CB1-1
Null	#57	==>	#58	0.000	0.000	TDS5
Pond	#58	==>	#64	0.026	0.412	CB1-2
Null	#59	==>	#60	0.000	0.000	WS1-2
Channel	#60	==>	#62	0.025	0.306	DD1-1
Null	#61	==>	#62	0.000	0.000	WS1-3
Null	#62	==>	#63	0.088	0.312	
Channel	#63	==>	#64	0.026	0.412	DD1-2
Channel	#64	==>	#27	0.663	0.201	Ramp Ditch 1
Pond	#65	==>	#27	0.000	0.000	MS1-2 & Pond 1-1




#20
Null
#21
Null
#26
Pond
#28
Null
#51
Pond
#52
Culvert
#48
Pond
#49
Chan'l
#50
Pond
#47
Chan'l
#53
Chan'l
#43
Null
#44
Pond
#45
Chan'l
#40
Null
#41
Pond
#38
Null
#39
Chan'l
#42
Chan'l
#46
Chan'l
#33
Null
#34
Pond

É #35 Chan'l
É #36 Culvert
É #37 Chan'l
É #30 Null
É #31 Chan'l
É #32 Chan'l
É #18 Chan'l
É #19 Chan'l
É #3 Null
É #4 Null
É #1 Null
É #2 Null
É #5 Null
É #6 Null
É #11 Pond
É #17 Chan'l
É #27 Null
É #22 Null
É #23 Null
É #24 Null
#25 Null

Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	1.24	250.00	20,136.00	3.34	1.674
#1	**Muskingum K:**					**1.674**
#2	8. Large gullies, diversions, and low flowing streams	0.67	245.00	36,792.31	2.44	4.188
#2	**Muskingum K:**					**4.188**
#3	8. Large gullies, diversions, and low flowing streams	0.99	210.00	21,118.00	2.99	1.961
#3	**Muskingum K:**					**1.961**
#4	8. Large gullies, diversions, and low flowing streams	0.77	227.00	29,388.00	2.63	3.103
#4	**Muskingum K:**					**3.103**
#5	8. Large gullies, diversions, and low flowing streams	0.47	45.00	9,601.00	2.05	1.300
#5	**Muskingum K:**					**1.300**
#11	8. Large gullies, diversions, and low flowing streams	0.20	1.20	600.00	1.34	0.124
#11	**Muskingum K:**					**0.124**
#17	8. Large gullies, diversions, and low flowing streams	0.20	22.40	11,199.99	1.34	2.321
#17	**Muskingum K:**					**2.321**
#18	8. Large gullies, diversions, and low flowing streams	3.00	42.00	1,400.00	5.19	0.074
#18	**Muskingum K:**					**0.074**
#19	8. Large gullies, diversions, and low flowing streams	0.30	10.00	3,384.00	1.63	0.576
#19	**Muskingum K:**					**0.576**
#26	8. Large gullies, diversions, and low flowing streams	3.23	40.00	1,239.00	5.39	0.063
#26	**Muskingum K:**					**0.063**
#27	8. Large gullies, diversions, and low flowing streams	1.02	28.00	2,736.00	3.03	0.250
#27	**Muskingum K:**					**0.250**
#28	8. Large gullies, diversions, and low flowing streams	0.30	4.26	1,423.00	1.64	0.241
#28	**Muskingum K:**					**0.241**
#29	8. Large gullies, diversions, and low flowing streams	0.30	3.64	1,216.00	1.64	0.205
#29	**Muskingum K:**					**0.205**
#34	8. Large gullies, diversions, and low flowing streams	1.33	1.99	150.00	3.45	0.012
#34	**Muskingum K:**					**0.012**
#35	8. Large gullies, diversions, and low flowing streams	2.00	1.58	79.50	4.24	0.005
#35	**Muskingum K:**					**0.005**
#39	8. Large gullies, diversions, and low flowing streams	0.80	2.00	250.00	2.68	0.025

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#39	**Muskingum K:**					**0.025**
#42	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#42	**Muskingum K:**					**0.026**
#44	8. Large gullies, diversions, and low flowing streams	0.98	4.50	460.00	2.96	0.043
#44	**Muskingum K:**					**0.043**
#45	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#45	**Muskingum K:**					**0.026**
#48	8. Large gullies, diversions, and low flowing streams	0.09	1.98	2,202.63	0.90	0.679
#48	**Muskingum K:**					**0.679**
#50	8. Large gullies, diversions, and low flowing streams	6.00	82.50	1,375.00	7.34	0.052
#50	**Muskingum K:**					**0.052**
#51	8. Large gullies, diversions, and low flowing streams	0.17	0.51	300.12	1.23	0.067
#51	**Muskingum K:**					**0.067**
#54	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#54	**Muskingum K:**					**0.026**
#56	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#56	**Muskingum K:**					**0.026**
#58	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#58	**Muskingum K:**					**0.026**
#60	8. Large gullies, diversions, and low flowing streams	0.80	2.00	249.99	2.68	0.025
#60	**Muskingum K:**					**0.025**
#62	8. Large gullies, diversions, and low flowing streams	0.89	8.01	900.00	2.83	0.088
#62	**Muskingum K:**					**0.088**
#63	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#63	**Muskingum K:**					**0.026**
#64	8. Large gullies, diversions, and low flowing streams	0.15	4.00	2,725.00	1.14	0.663
#64	**Muskingum K:**					**0.663**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#65	In	22.110	22.110	55.22	2.82
	Out			0.00	0.00
#61		34.787	34.787	82.44	3.99
#59		41.030	41.030	80.13	4.63
#60		0.000	41.030	80.13	4.63
#62		0.000	75.817	160.68	8.62
#63		0.000	75.817	153.27	8.62
#57		4.740	4.740	15.07	0.54
#58	In	0.000	4.740	15.07	0.54
	Out			14.83	0.36
#55		4.870	4.870	18.90	0.78
#56	In	0.000	4.870	18.90	0.78
	Out			18.71	0.58
#54		42.850	42.850	97.50	4.86
#64		0.000	128.277	243.74	14.43
#29		286.550	286.550	611.87	32.52
#20		1,855.800	1,855.800	1,070.10	185.29
#21		2,370.300	4,226.100	1,984.61	471.31
#26	In	13.260	4,239.359	1,986.05	473.82
	Out			1,560.89	461.00
#28		67.100	4,306.459	1,564.05	468.55
#51	In	4.820	4.820	15.32	0.55
	Out			0.37	0.07
#52		0.200	5.020	0.78	0.10
#48	In	8.810	8.810	14.36	0.80
	Out			3.21	0.30
#49		37.570	46.380	55.76	5.08
#50	In	0.000	46.380	55.76	5.08
	Out			20.28	2.89
#47		29.270	29.270	61.38	2.89
#53		0.000	80.670	61.47	5.88
#43		6.207	6.207	12.31	0.57
#44	In	0.000	6.207	12.31	0.57
	Out			2.03	0.23
#45		0.000	6.207	2.03	0.23
#40		12.150	12.150	25.52	1.55
#41	In	0.000	12.150	25.52	1.55
	Out			3.81	0.35
#38		66.380	66.380	115.20	6.44

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#39		0.000	66.380	115.20	6.44
#42		0.000	78.530	115.20	6.78
#46		0.000	84.737	115.20	7.01
#33		14.130	14.130	31.88	1.80
#34	In	0.000	14.130	31.88	1.80
	Out			18.31	1.08
#35		0.000	14.130	18.31	1.08
#36		0.000	14.130	18.31	1.08
#37		0.000	14.130	18.31	1.08
#30		282.150	282.150	257.43	27.26
#31		0.000	282.150	257.43	27.26
#32		0.000	282.150	257.43	27.26
#18		1,500.640	1,500.640	595.21	97.48
#19		418.020	1,918.660	880.72	137.83
#3		3,978.700	3,978.700	1,870.69	334.20
#4		3,216.100	7,194.800	2,502.37	652.26
#1		8,477.899	8,477.899	3,723.42	794.51
#2		3,838.900	12,316.800	3,996.89	1,272.67
#5		5,494.300	25,005.900	5,627.79	2,609.48
#6		3,036.900	28,042.800	5,582.91	2,957.87
#11	In	53.960	30,311.700	5,589.27	3,133.43
	Out			5,099.77	3,133.44
#17		0.000	30,477.110	5,098.07	3,146.32
#27		43.270	35,263.770	5,083.83	3,666.69
#22		519.990	35,783.760	5,082.29	3,731.19
#23		233.290	36,017.050	5,081.26	3,759.53
#24		1,164.130	37,181.180	5,076.50	3,897.92
#25		648.980	37,830.160	5,069.69	3,972.37

Structure Detail:

Structure #65 (Pond)

MS1-2 & Pond 1-1

Pond Inputs:

Initial Pool Elev:	5,442.10 ft
Initial Pool:	0.03 ac-ft

Broad-crested Weir

Weir Width (ft)	Spillway Elev (ft)
40.00	5,451.80

Pond Results:

Peak Elevation:	5,448.37 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,442.00	0.260	0.000	0.000		
5,442.10	0.265	0.026	0.000		
5,442.50	0.285	0.136	0.000		
5,443.00	0.311	0.285	0.000		
5,443.50	0.339	0.448	0.000		
5,444.00	0.367	0.624	0.000		
5,444.50	0.397	0.815	0.000		
5,445.00	0.427	1.021	0.000		
5,445.50	0.459	1.242	0.000		
5,446.00	0.492	1.480	0.000		
5,446.50	0.526	1.734	0.000		
5,447.00	0.562	2.006	0.000		
5,447.50	0.598	2.296	0.000		
5,448.00	0.636	2.605	0.000		
5,448.37	0.665	2.846	0.000	0.00	Peak Stage
5,448.50	0.675	2.933	0.000		
5,449.00	0.715	3.280	0.000		
5,449.50	0.756	3.648	0.000		
5,450.00	0.798	4.036	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,450.50	0.841	4.446	0.000		
5,451.00	0.886	4.878	0.000		
5,451.50	0.931	5.332	0.000		
5,451.80	0.959	5.615	0.000		Spillway #1
5,452.00	0.978	5.809	11.061		

Detailed Discharge Table

Elevation (ft)	Broad-crested Weir (cfs)	Combined Total Discharge (cfs)
5,442.00	0.000	0.000
5,442.10	0.000	0.000
5,442.50	0.000	0.000
5,443.00	0.000	0.000
5,443.50	0.000	0.000
5,444.00	0.000	0.000
5,444.50	0.000	0.000
5,445.00	0.000	0.000
5,445.50	0.000	0.000
5,446.00	0.000	0.000
5,446.50	0.000	0.000
5,447.00	0.000	0.000
5,447.50	0.000	0.000
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,451.80	0.000	0.000
5,452.00	11.061	11.061

Structure #61 (Null)

WS1-3

Structure #59 (Null)

WS1-2

Structure #60 (Erodible Channel)

DD1-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	80.13 cfs	
Depth:	1.99 ft	2.99 ft
Top Width:	11.93 ft	17.93 ft
Velocity:	6.76 fps	
X-Section Area:	11.86 sq ft	
Hydraulic Radius:	0.943 ft	
Froude Number:	1.19	

Structure #62 (Null)

Structure #63 (Erodible Channel)

DD1-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.2	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	153.27 cfs	
Depth:	1.59 ft	2.59 ft
Top Width:	18.36 ft	22.36 ft
Velocity:	6.35 fps	
X-Section Area:	24.12 sq ft	
Hydraulic Radius:	1.262 ft	
Froude Number:	0.98	

Structure #57 (Null)

TDS5

Structure #58 (Pond)

CB1-2

Pond Inputs:

Initial Pool Elev:	5,450.50 ft
Initial Pool:	0.24 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,452.12 ft
Dewater Time:	0.17 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,449.00	0.150	0.000	0.000		
5,449.50	0.156	0.076	0.000		
5,450.00	0.162	0.156	0.000		
5,450.50	0.168	0.238	0.000		
5,451.00	0.174	0.324	0.000		
5,451.50	0.180	0.413	0.000		Spillway #1
5,452.00	0.187	0.504	3.871	4.00	
5,452.12	0.188	0.526	14.828	0.05	Peak Stage
5,452.50	0.193	0.599	51.179		
5,453.00	0.200	0.698	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #55 (Null)

MS1-1

Structure #56 (Pond)

CB1-1

Pond Inputs:

Initial Pool Elev:	5,449.70 ft
Initial Pool:	0.20 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,451.66 ft
Dewater Time:	0.16 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,448.00	0.100	0.000	0.000		
5,448.50	0.108	0.052	0.000		
5,449.00	0.117	0.108	0.000		
5,449.50	0.131	0.170	0.000		
5,449.70	0.137	0.197	0.000		
5,449.75	0.139	0.204	0.000		
5,450.00	0.146	0.240	0.000		
5,450.25	0.148	0.277	0.000		
5,450.50	0.151	0.314	0.000		
5,451.00	0.156	0.391	0.000		Spillway #1

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,451.50	0.166	0.471	3.871	3.90	
5,451.66	0.170	0.498	18.709	0.05	Peak Stage
5,452.00	0.177	0.557	51.179		
5,452.50	0.188	0.648	105.737		
5,453.00	0.200	0.745	174.956		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,449.70	0.000	0.000
5,449.75	0.000	0.000
5,450.00	0.000	0.000
5,450.25	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	3.871	3.871
5,452.00	51.179	51.179
5,452.50	105.737	105.737
5,453.00	174.956	174.956

Structure #54 (Null)

WS1-1

Structure #64 (Riprap Channel)

Ramp Ditch 1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	243.74 cfs	
Depth:	1.24 ft	2.24 ft
Top Width:	16.94 ft	20.94 ft
Velocity*:		
X-Section Area:	17.88 sq ft	
Hydraulic Radius:	1.020 ft	
Froude Number*:		
Manning's n*:		
Dmin:	5.00 in	
D50:	15.00 in	
Dmax:	18.75 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #29 (Null)

NNSWS06B (Drop Structure)

Structure #20 (Null)

NN S02 & NN S01

Structure #21 (Null)

NNS03 (NN Imp),04,05

Structure #26 (Pond)

Oultet of NN S03 Impoundment Area

Pond Inputs:

Initial Pool Elev:	5,441.01 ft
Initial Pool:	0.00 ac-ft

Pond Results:

Peak Elevation:	5,454.40 ft
Dewater Time:	0.81 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,441.00	0.000	0.000	0.000	
5,441.01	0.011	0.000	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,442.00	1.075	0.394	0.001	
5,443.00	2.094	1.951	0.001	
5,444.00	2.823	4.400	0.001	
5,445.00	4.127	7.855	0.001	
5,446.00	5.827	12.807	0.001	
5,447.00	7.996	19.690	55.000	14.55
5,448.00	10.478	28.899	300.000	2.25
5,448.48	12.103	34.314	574.837	0.50
5,449.00	13.565	40.984	872.600	0.20
5,450.00	16.428	55.958	1,000.000	

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,441.00	0.000	0.000
5,441.01	0.000	0.000
5,442.00	0.001	0.001
5,443.00	0.001	0.001
5,444.00	0.001	0.001
5,445.00	0.001	0.001
5,446.00	0.001	0.001
5,447.00	55.000	55.000
5,448.00	300.000	300.000
5,448.48	574.837	574.837
5,449.00	872.600	872.600
5,450.00	1,000.000	1,000.000

Structure #28 (Null)

NNSWS06A (Drop Structure)

Structure #51 (Pond)

TDS7TDS & Berm (CB2-2)

Pond Inputs:

Initial Pool Elev:	5,474.20 ft
Initial Pool:	0.01 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,477.00	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,477.06 ft
Dewater Time:	0.17 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,474.00	0.057	0.000	0.000		
5,474.01	0.058	0.001	0.000		
5,474.20	0.068	0.013	0.000		
5,474.50	0.086	0.036	0.000		
5,475.00	0.118	0.086	0.000		
5,475.50	0.156	0.155	0.000		
5,476.00	0.200	0.243	0.000		
5,476.50	0.243	0.354	0.000		
5,477.00	0.291	0.487	0.000		Spillway #1
5,477.06	0.300	0.507	0.368	4.00	Peak Stage
5,477.50	0.343	0.646	2.913		
5,478.00	0.400	0.832	39.083		
5,478.50	0.446	1.043	81.546		
5,479.00	0.495	1.278	136.186		
5,479.50	0.546	1.538	202.723		
5,480.00	0.600	1.825	281.166		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,474.00	0.000	0.000
5,474.01	0.000	0.000
5,474.20	0.000	0.000
5,474.50	0.000	0.000
5,475.00	0.000	0.000
5,475.50	0.000	0.000
5,476.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.50	0.000	0.000
5,477.00	0.000	0.000
5,477.50	2.913	2.913
5,478.00	39.083	39.083
5,478.50	81.546	81.546
5,479.00	136.186	136.186
5,479.50	202.723	202.723
5,480.00	281.166	281.166

Structure #52 (Culvert)

CP101 & Material Stockpile 2

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.00	0.0240	1.00	0.50	0.90

Culvert Results:

Design Discharge = 0.78 cfs

Minimum pipe diameter: 1 - 10 inch pipe(s) required

Structure #48 (Pond)

TDS6 & CB2-3

Pond Inputs:

Initial Pool Elev:	5,484.40 ft
Initial Pool:	0.38 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,486.00	100.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,486.13 ft
Dewater Time:	0.16 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,482.00	0.100	0.000	0.000		
5,482.50	0.122	0.055	0.000		
5,483.00	0.146	0.122	0.000		
5,483.50	0.172	0.202	0.000		
5,484.00	0.200	0.295	0.000		
5,484.40	0.235	0.382	0.000		
5,484.50	0.244	0.405	0.000		
5,484.70	0.263	0.456	0.000		
5,484.75	0.267	0.469	0.000		
5,485.00	0.291	0.539	0.000		
5,485.50	0.343	0.698	0.000		
5,486.00	0.400	0.883	0.000		Spillway #1
5,486.13	0.409	0.940	3.206	3.75	Peak Stage
5,486.50	0.446	1.095	11.938		
5,487.00	0.495	1.330	23.876		
5,487.50	0.546	1.590	54.567		
5,488.00	0.600	1.877	96.681		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,482.00	0.000	0.000
5,482.50	0.000	0.000
5,483.00	0.000	0.000
5,483.50	0.000	0.000
5,484.00	0.000	0.000
5,484.40	0.000	0.000
5,484.50	0.000	0.000
5,484.70	0.000	0.000
5,484.75	0.000	0.000
5,485.00	0.000	0.000
5,485.50	0.000	0.000
5,486.00	0.000	0.000
5,486.50	11.938	11.938
5,487.00	23.876	23.876
5,487.50	54.567	54.567
5,488.00	96.681	96.681

Structure #49 (Erodible Channel)

MS2-1 & Ditch

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	0.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	55.76 cfs	
Depth:	0.97 ft	1.97 ft
Top Width:	15.86 ft	19.86 ft
Velocity:	4.14 fps	
X-Section Area:	13.46 sq ft	
Hydraulic Radius:	0.825 ft	
Froude Number:	0.79	

Structure #50 (Pond)

MS2-1 Berm and Spillway (CB2-1)

Pond Inputs:

Initial Pool Elev:	5,480.00 ft
Initial Pool:	1.89 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,482.00	15.00	2.00:1	2.00:1	25.00

Pond Results:

Peak Elevation:	5,482.63 ft
Dewater Time:	0.57 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,476.00	0.230	0.000	0.000	
5,476.50	0.268	0.124	0.000	
5,477.00	0.309	0.269	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,477.50	0.353	0.434	0.000		
5,478.00	0.400	0.622	0.000		
5,478.50	0.506	0.848	0.000		
5,479.00	0.625	1.130	0.000		
5,479.50	0.758	1.476	0.000		
5,479.75	0.828	1.674	0.000		
5,480.00	0.900	1.890	0.000		
5,480.20	0.938	2.074	0.000		
5,480.50	0.994	2.363	0.000		
5,480.82	1.056	2.691	0.000		
5,481.00	1.091	2.884	0.000		
5,481.50	1.193	3.455	0.000		
5,482.00	1.300	4.078	0.000		Spillway #1
5,482.50	1.306	4.730	4.829	12.00	
5,482.63	1.308	4.903	20.284	1.70	Peak Stage
5,483.00	1.312	5.384	63.277		
5,483.50	1.318	6.042	129.940		
5,484.00	1.325	6.703	213.757		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.00	0.000	0.000
5,476.50	0.000	0.000
5,477.00	0.000	0.000
5,477.50	0.000	0.000
5,478.00	0.000	0.000
5,478.50	0.000	0.000
5,479.00	0.000	0.000
5,479.50	0.000	0.000
5,479.75	0.000	0.000
5,480.00	0.000	0.000
5,480.20	0.000	0.000
5,480.50	0.000	0.000
5,480.82	0.000	0.000
5,481.00	0.000	0.000
5,481.50	0.000	0.000
5,482.00	0.000	0.000
5,482.50	4.829	4.829

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,483.00	63.277	63.277
5,483.50	129.940	129.940
5,484.00	213.757	213.757

Structure #47 (Erodible Channel)

WS2-1 & DD2-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	61.38 cfs	
Depth:	0.82 ft	1.82 ft
Top Width:	15.29 ft	19.29 ft
Velocity:	5.48 fps	
X-Section Area:	11.21 sq ft	
Hydraulic Radius:	0.715 ft	
Froude Number:	1.13	

Structure #53 (Riprap Channel)

Ramp Ditch-2

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
6.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	61.47 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	0.71 ft	1.71 ft
Top Width:	8.84 ft	12.84 ft
Velocity*:		
X-Section Area:	5.27 sq ft	
Hydraulic Radius:	0.574 ft	
Froude Number*:		
Manning's n*:		
Dmin:	4.00 in	
D50:	12.00 in	
Dmax:	15.00 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #43 (Null)

TDS8

Structure #44 (Pond)

CB3-2

Pond Inputs:

Initial Pool Elev:	5,468.70 ft
Initial Pool:	0.18 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,470.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,470.26 ft
Dewater Time:	0.18 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,468.00	0.250	0.000	0.000	
5,468.50	0.256	0.126	0.000	
5,468.70	0.258	0.178	0.000	
5,468.80	0.260	0.204	0.000	
5,469.00	0.262	0.256	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,469.20	0.264	0.309	0.000		
5,469.31	0.266	0.338	0.000		
5,469.50	0.268	0.388	0.000		
5,470.00	0.274	0.524	0.000		Spillway #1
5,470.26	0.277	0.597	2.027	4.30	Peak Stage
5,470.50	0.280	0.663	3.871		
5,471.00	0.287	0.804	51.179		
5,471.50	0.293	0.950	105.737		
5,472.00	0.300	1.098	174.956		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,468.00	0.000	0.000
5,468.50	0.000	0.000
5,468.70	0.000	0.000
5,468.80	0.000	0.000
5,469.00	0.000	0.000
5,469.20	0.000	0.000
5,469.31	0.000	0.000
5,469.50	0.000	0.000
5,470.00	0.000	0.000
5,470.50	3.871	3.871
5,471.00	51.179	51.179
5,471.50	105.737	105.737
5,472.00	174.956	174.956

Structure #45 (Erodible Channel)

DD3-3

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	2.03 cfs	
Depth:	0.50 ft	1.50 ft
Top Width:	3.00 ft	9.00 ft
Velocity:	2.69 fps	
X-Section Area:	0.75 sq ft	
Hydraulic Radius:	0.237 ft	
Froude Number:	0.95	

Structure #40 (Null)

MS3-1

Structure #41 (Pond)

CB3-1

Pond Inputs:

Initial Pool Elev:	5,464.10 ft
Initial Pool:	0.05 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,466.71 ft
Dewater Time:	0.15 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,464.00	0.450	0.000	0.000	
5,464.10	0.452	0.045	0.000	
5,464.20	0.455	0.091	0.000	
5,464.50	0.462	0.228	0.000	
5,465.00	0.474	0.462	0.000	
5,465.50	0.486	0.702	0.000	
5,465.65	0.490	0.775	0.000	
5,466.00	0.499	0.948	0.000	
5,466.50	0.511	1.201	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,466.60	0.514	1.252	0.000		Spillway #1
5,466.71	0.517	1.307	3.809	3.60	Peak Stage
5,467.00	0.524	1.460	14.423		
5,467.50	0.537	1.725	32.456		
5,468.00	0.550	1.997	72.062		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,464.00	0.000	0.000
5,464.10	0.000	0.000
5,464.20	0.000	0.000
5,464.50	0.000	0.000
5,465.00	0.000	0.000
5,465.50	0.000	0.000
5,465.65	0.000	0.000
5,466.00	0.000	0.000
5,466.50	0.000	0.000
5,466.60	0.000	0.000
5,467.00	14.423	14.423
5,467.50	32.456	32.456
5,468.00	72.062	72.062

Structure #38 (Null)

WS3-1

Structure #39 (Erodible Channel)

DD3-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.4	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	115.20 cfs	

	w/o Freeboard	w/ Freeboard
Depth:	1.29 ft	2.29 ft
Top Width:	17.17 ft	21.17 ft
Velocity:	6.11 fps	
X-Section Area:	18.85 sq ft	
Hydraulic Radius:	1.060 ft	
Froude Number:	1.03	

Structure #42 (Erodible Channel)

DD3-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	115.20 cfs	
Depth:	1.27 ft	2.27 ft
Top Width:	17.07 ft	21.07 ft
Velocity:	6.25 fps	
X-Section Area:	18.42 sq ft	
Hydraulic Radius:	1.043 ft	
Froude Number:	1.06	

Structure #46 (Riprap Channel)

DD3-4 Ramp Ditch 3

Triangular Riprap Channel Inputs:

Material: Riprap

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	115.20 cfs	
Depth:	2.52 ft	3.52 ft
Top Width:	10.07 ft	14.07 ft
Velocity:	9.08 fps	
X-Section Area:	12.69 sq ft	
Hydraulic Radius:	1.126 ft	
Froude Number:	1.43	
Manning's n:	0.0470	
Dmin:	5.00 in	
D50:	9.00 in	
Dmax:	12.00 in	

Structure #33 (Null)

MS4-1 & WS4-1

Structure #34 (Pond)

CB4-1

Pond Inputs:

Initial Pool Elev:	5,464.90 ft
Initial Pool:	0.81 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,466.99 ft
Dewater Time:	0.17 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,462.00	0.200	0.000	0.000	
5,462.01	0.200	0.002	0.000	
5,462.50	0.225	0.106	0.000	
5,463.00	0.252	0.226	0.000	
5,463.50	0.280	0.359	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,464.00	0.310	0.506	0.000		
5,464.50	0.341	0.669	0.000		
5,464.90	0.367	0.810	0.000		
5,465.00	0.373	0.847	0.000		
5,465.50	0.407	1.042	0.000		
5,466.00	0.443	1.255	0.000		
5,466.50	0.480	1.485	0.000		
5,466.60	0.487	1.534	0.000		Spillway #1
5,466.99	0.517	1.728	18.314	4.05	Peak Stage
5,467.00	0.518	1.735	18.923		
5,467.50	0.558	2.004	42.582		
5,468.00	0.600	2.293	93.619		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,462.00	0.000	0.000
5,462.01	0.000	0.000
5,462.50	0.000	0.000
5,463.00	0.000	0.000
5,463.50	0.000	0.000
5,464.00	0.000	0.000
5,464.50	0.000	0.000
5,464.90	0.000	0.000
5,465.00	0.000	0.000
5,465.50	0.000	0.000
5,466.00	0.000	0.000
5,466.50	0.000	0.000
5,466.60	0.000	0.000
5,467.00	18.923	18.923
5,467.50	42.582	42.582
5,468.00	93.619	93.619

Structure #35 (Erodible Channel)

DD4-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	0.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.31 cfs	
Depth:	1.48 ft	2.48 ft
Top Width:	8.90 ft	14.90 ft
Velocity:	2.78 fps	
X-Section Area:	6.59 sq ft	
Hydraulic Radius:	0.703 ft	
Froude Number:	0.57	

Structure #36 (Culvert)

CP102

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.50	0.0240	2.00	1.50	0.90

Culvert Results:

Design Discharge = 18.31 cfs

Minimum pipe diameter: 1 - 42 inch pipe(s) required

Structure #37 (Riprap Channel)

DD4-2 Ramp Ditch 4

Triangular Riprap Channel Inputs:

Material: Riprap

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.31 cfs	
Depth:	1.18 ft	2.18 ft

	w/o Freeboard	w/ Freeboard
Top Width:	4.71 ft	8.71 ft
Velocity:	6.59 fps	
X-Section Area:	2.78 sq ft	
Hydraulic Radius:	0.527 ft	
Froude Number:	1.51	
Manning's n:	0.0390	
Dmin:	3.00 in	
D50:	6.00 in	
Dmax:	9.00 in	

Structure #30 (Null)

WS5-1

Structure #31 (Erodible Channel)

DD5-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	257.43 cfs	
Depth:	2.23 ft	3.23 ft
Top Width:	20.93 ft	24.93 ft
Velocity:	7.00 fps	
X-Section Area:	36.78 sq ft	
Hydraulic Radius:	1.673 ft	
Froude Number:	0.93	

Structure #32 (Riprap Channel)

Ramp Ditch 5

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	257.43 cfs	
Depth:	1.75 ft	2.75 ft
Top Width:	18.99 ft	22.99 ft
Velocity:	9.52 fps	
X-Section Area:	27.05 sq ft	
Hydraulic Radius:	1.366 ft	
Froude Number:	1.40	
Manning's n:	0.0510	
Dmin:	5.00 in	
D50:	9.00 in	
Dmax:	12.00 in	

Structure #18 (Erodible Channel)

Upper East Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
14.00	2.0:1	2.0:1	0.6	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	595.21 cfs	
Depth:	4.09 ft	
Top Width:	30.35 ft	
Velocity:	6.56 fps	
X-Section Area:	90.67 sq ft	
Hydraulic Radius:	2.809 ft	
Froude Number:	0.67	

Structure #19 (Erodible Channel)

Lower E Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
14.00	2.0:1	2.0:1	0.3	0.0350				5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	880.72 cfs	
Depth:	5.97 ft	
Top Width:	37.89 ft	
Velocity:	5.68 fps	
X-Section Area:	154.94 sq ft	
Hydraulic Radius:	3.806 ft	
Froude Number:	0.50	

Structure #3 (Null)

Structure #4 (Null)

Structure #1 (Null)

Structure #2 (Null)

Structure #5 (Null)

Structure #6 (Null)

EAST LEASE BNDY

Structure #11 (Pond)

Sta:118+00 - U Shaped Impoundment

Pond Inputs:

Initial Pool Elev:	5,430.01 ft
Initial Pool:	0.00 ac-ft

Pond Results:

Peak Elevation:	5,453.39 ft
Dewater Time:	1.58 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,430.00	0.000	0.000	0.000		
5,430.01	0.002	0.000	0.000		
5,431.00	0.225	0.082	3.900	1.70	
5,432.00	0.822	0.575	8.230	1.05	
5,433.00	2.809	2.292	17.280	1.70	
5,434.00	6.235	6.701	31.060	2.25	
5,435.00	11.008	15.210	45.120	2.75	
5,436.00	16.934	29.075	65.530	3.05	
5,437.00	24.132	49.503	92.860	3.15	
5,438.00	29.977	76.504	129.180	3.00	
5,439.00	36.455	109.667	168.090	2.70	
5,440.00	39.413	147.592	209.680	2.45	
5,441.00	42.486	188.531	263.440	2.10	
5,442.00	43.250	231.399	329.180	1.75	
5,443.00	44.020	275.033	421.610	1.40	
5,444.00	44.637	319.361	515.750	1.20	
5,445.00	45.259	364.309	594.490	1.00	
5,446.00	46.060	409.968	807.140	0.90	
5,447.00	46.869	456.432	1,021.210	0.75	
5,448.00	48.100	503.915	1,167.930	0.75	
5,449.00	49.346	552.637	1,720.410	0.65	
5,450.00	51.291	602.952	2,309.040	0.55	
5,451.00	53.274	655.232	2,928.330	0.45	
5,452.00	56.392	710.057	3,767.860	0.50	
5,452.50	57.976	738.649	4,223.680	0.25	
5,453.00	59.573	768.035	4,693.290	0.45	
5,453.39	62.475	792.706	5,099.766	1.45	Peak Stage
5,454.00	65.520	830.558	5,723.400		
5,455.00	71.750	899.169	6,850.570		

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,430.00	0.000	0.000
5,430.01	0.000	0.000
5,431.00	3.900	3.900
5,432.00	8.230	8.230
5,433.00	17.280	17.280

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,434.00	31.060	31.060
5,435.00	45.120	45.120
5,436.00	65.530	65.530
5,437.00	92.860	92.860
5,438.00	129.180	129.180
5,439.00	168.090	168.090
5,440.00	209.680	209.680
5,441.00	263.440	263.440
5,442.00	329.180	329.180
5,443.00	421.610	421.610
5,444.00	515.750	515.750
5,445.00	594.490	594.490
5,446.00	807.140	807.140
5,447.00	1,021.210	1,021.210
5,448.00	1,167.930	1,167.930
5,449.00	1,720.410	1,720.410
5,450.00	2,309.040	2,309.040
5,451.00	2,928.330	2,928.330
5,452.00	3,767.860	3,767.860
5,452.50	4,223.680	4,223.680
5,453.00	4,693.290	4,693.290
5,454.00	5,723.400	5,723.400
5,455.00	6,850.570	6,850.570

Structure #17 (Erodible Channel)

Pinabete Diversion

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
45.00	2.0:1	2.0:1	0.2	0.0400		50.00		5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	5,098.07 cfs	
Depth:	11.31 ft	16.97 ft
Top Width:	90.25 ft	112.87 ft
Velocity:	6.66 fps	
X-Section Area:	764.92 sq ft	

	w/o Freeboard	w/ Freeboard
Hydraulic Radius:	8.002 ft	
Froude Number:	0.40	

Structure #27 (Null)

End of P Diversion, NNSWS06C,S7SW1

Structure #22 (Null)

NN SO4 (SWS07)

Structure #23 (Null)

NN S05 (SWS08)

Structure #24 (Null)

NN S06 (SWS09,10,11,12,13,14)

Structure #25 (Null)

NN S07 (SWS15,16,17,18,19)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#65	1	22.110	0.202	0.000	0.000	89.000	M	55.22	2.822
	Σ	**22.110**						**55.22**	**2.822**
#61	1	34.787	0.134	0.000	0.000	86.200	M	82.44	3.993
	Σ	**34.787**						**82.44**	**3.993**
#59	1	41.030	0.320	0.000	0.000	86.200	M	80.13	4.631
	Σ	**41.030**						**80.13**	**4.631**
#60	Σ	**41.030**						**80.13**	**4.631**
#62	Σ	**75.817**						**160.68**	**8.624**
#63	Σ	**75.817**						**153.27**	**8.624**
#57	1	4.740	0.080	0.000	0.000	81.500	M	15.07	0.537
	Σ	**4.740**						**15.07**	**0.537**
#58	Σ	**4.740**						**15.07**	**0.537**
#55	1	4.870	0.122	0.000	0.000	89.000	M	18.90	0.777
	Σ	**4.870**						**18.90**	**0.777**
#56	Σ	**4.870**						**18.90**	**0.777**
#54	1	42.850	0.194	0.000	0.000	86.200	M	97.50	4.857
	Σ	**42.850**						**97.50**	**4.857**
#64	Σ	**128.277**						**243.74**	**14.427**
#29	1	286.550	0.248	0.000	0.000	86.200	M	611.87	32.520
	Σ	**286.550**						**611.87**	**32.520**
#20	1	856.430	1.610	0.000	0.000	85.700	M	580.54	94.129
	2	999.370	1.260	0.814	0.291	81.700	M	674.79	91.158
	Σ	**1,855.800**						**1,070.10**	**185.287**
#21	1	925.920	1.675	0.409	0.297	88.800	M	702.33	116.778
	2	1,019.220	1.106	0.193	0.261	87.000	M	982.52	118.770
	3	425.160	0.766	0.000	0.000	87.400	M	542.73	50.474
	Σ	**4,226.100**						**1,984.61**	**471.308**
#26	1	13.260	0.076	0.000	0.000	93.000	M	55.61	2.509
	Σ	**4,239.359**						**1,986.05**	**473.817**
#28	1	67.100	0.380	0.000	0.000	86.200	M	122.05	7.549
	Σ	**4,306.459**						**1,564.05**	**468.550**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#51	1	4.820	0.055	0.000	0.000	81.500	M	15.32	0.546
	Σ	**4.820**						**15.32**	**0.546**
#52	1	0.200	0.004	0.000	0.000	89.000	M	0.78	0.032
	Σ	**5.020**						**0.78**	**0.103**
#48	1	8.810	0.301	0.000	0.000	81.500	M	14.36	0.799
	Σ	**8.810**						**14.36**	**0.799**
#49	1	37.570	0.681	0.000	0.000	89.000	M	55.76	4.784
	Σ	**46.380**						**55.76**	**5.081**
#50	Σ	**46.380**						**55.76**	**5.081**
#47	1	29.270	0.146	0.000	0.000	82.900	M	61.38	2.886
	Σ	**29.270**						**61.38**	**2.886**
#53	Σ	**80.670**						**61.47**	**5.880**
#43	1	6.207	0.137	0.000	0.000	81.500	M	12.31	0.572
	Σ	**6.207**						**12.31**	**0.572**
#44	Σ	**6.207**						**12.31**	**0.572**
#45	Σ	**6.207**						**2.03**	**0.226**
#40	1	12.150	0.354	0.000	0.000	89.000	M	25.52	1.553
	Σ	**12.150**						**25.52**	**1.553**
#41	Σ	**12.150**						**25.52**	**1.553**
#38	1	66.380	0.302	0.000	0.000	82.900	M	115.20	6.435
	Σ	**66.380**						**115.20**	**6.435**
#39	Σ	**66.380**						**115.20**	**6.435**
#42	Σ	**78.530**						**115.20**	**6.781**
#46	Σ	**84.737**						**115.20**	**7.007**
#33	1	14.130	0.291	0.000	0.000	89.000	M	31.88	1.803
	Σ	**14.130**						**31.88**	**1.803**
#34	Σ	**14.130**						**31.88**	**1.803**
#35	Σ	**14.130**						**18.31**	**1.079**
#36	Σ	**14.130**						**18.31**	**1.079**
#37	Σ	**14.130**						**18.31**	**1.079**
#30	1	282.150	0.909	0.000	0.000	82.900	M	257.43	27.264
	Σ	**282.150**						**257.43**	**27.264**

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#31	**∑**	**282.150**						**257.43**	**27.264**
#32	**∑**	**282.150**						**257.43**	**27.264**
#18	1	1,352.640	1.370	0.000	0.000	75.000	M	592.83	87.376
	2	148.000	1.315	1.026	0.249	76.000	M	71.01	10.099
	∑	**1,500.640**						**595.21**	**97.475**
#19	1	418.020	1.293	0.000	0.000	82.900	M	293.87	40.355
	∑	**1,918.660**						**880.72**	**137.830**
#3	1	791.300	1.145	1.181	0.350	80.800	M	548.79	69.090
	2	1,079.100	0.915	0.596	0.351	80.900	M	886.46	94.716
	3	450.300	0.571	0.319	0.355	81.300	M	519.11	40.336
	4	742.600	0.625	0.000	0.000	78.500	M	698.01	57.746
	5	915.400	1.119	0.000	0.000	78.800	M	581.13	72.315
	∑	**3,978.700**						**1,870.69**	**334.204**
#4	1	546.400	0.726	1.710	0.319	81.700	M	548.21	49.872
	2	441.200	0.503	1.429	0.318	86.000	M	689.41	49.238
	3	889.400	0.815	0.998	0.318	82.100	M	841.53	82.723
	4	1,339.100	0.919	0.000	0.000	84.000	M	1,278.96	136.222
	∑	**7,194.800**						**2,502.37**	**652.258**
#1	1	1,242.300	1.349	1.359	0.354	80.800	M	759.74	108.443
	2	1,662.000	1.465	0.865	0.359	80.300	M	928.22	141.533
	3	1,434.000	1.573	1.257	0.357	81.100	M	789.12	127.029
	4	842.700	1.102	0.977	0.364	81.000	M	607.72	74.296
	5	676.100	1.067	1.113	0.365	81.600	M	514.96	61.377
	6	1,223.200	0.778	0.596	0.352	81.800	M	1,177.02	112.166
	7	743.100	0.745	0.530	0.354	83.600	M	806.07	74.203
	8	654.500	0.801	0.000	0.000	92.200	M	999.67	95.459
	∑	**8,477.899**						**3,723.42**	**794.506**
#2	1	609.500	0.668	1.219	0.340	85.700	M	787.86	67.089
	2	537.100	0.610	1.436	0.329	91.600	M	952.72	76.459
	3	455.000	0.546	1.288	0.324	82.000	M	558.96	42.132
	4	627.000	0.634	0.852	0.324	87.900	M	927.65	76.062
	5	653.100	0.452	0.453	0.315	91.200	M	1,343.82	91.413
	6	957.200	0.984	0.000	0.000	89.600	M	1,133.01	125.006
	∑	**12,316.800**						**3,996.89**	**1,272.667**
#5	1	763.100	0.682	3.507	0.293	84.100	M	900.89	78.011
	2	983.300	1.117	2.231	0.289	89.200	M	1,041.85	126.184
	3	1,022.000	0.996	1.587	0.291	92.000	M	1,331.20	147.840
	4	688.700	1.908	1.255	0.291	80.800	M	319.44	60.112

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
	5	754.300	2.307	1.084	0.287	86.200	M	390.11	84.785
	6	628.400	0.538	0.595	0.301	93.000	M	1,269.63	94.857
	7	654.500	0.560	0.000	0.000	91.500	M	1,215.77	92.767
	Σ	**25,005.900**						**5,627.79**	**2,609.480**
#6	1	901.400	1.151	1.896	0.315	81.100	M	632.40	79.865
	2	1,011.200	1.871	0.166	0.287	83.500	M	546.09	100.427
	3	1,124.300	1.126	0.000	0.000	92.800	M	1,385.24	168.102
	Σ	**28,042.800**						**5,582.91**	**2,957.874**
#11	1	53.960	0.000	0.000	0.000	91.000	M	218.30	9.385
	Σ	**30,311.700**						**5,589.27**	**3,133.433**
#17	Σ	**30,477.110**						**5,098.07**	**3,146.321**
#27	1	43.270	0.441	0.000	0.000	86.200	M	73.29	4.872
	Σ	**35,263.770**						**5,083.83**	**3,666.691**
#22	1	519.990	0.565	0.000	0.000	88.400	M	844.57	64.503
	Σ	**35,783.760**						**5,082.29**	**3,731.194**
#23	1	233.290	0.469	0.000	0.000	87.900	M	411.82	28.337
	Σ	**36,017.050**						**5,081.26**	**3,759.531**
#24	1	126.980	0.164	0.545	0.308	86.900	M	308.35	15.037
	2	235.630	0.327	0.427	0.341	86.700	M	465.84	27.208
	3	258.380	0.416	0.365	0.294	88.300	M	492.44	32.015
	4	180.930	0.449	0.176	0.301	86.700	M	310.28	20.827
	5	189.850	0.326	0.146	0.330	86.800	M	377.27	22.017
	6	172.360	0.753	0.000	0.000	88.300	M	231.96	21.287
	Σ	**37,181.180**						**5,076.50**	**3,897.923**
#25	1	91.450	0.220	0.854	0.310	86.800	M	206.92	10.636
	2	286.490	0.566	0.642	0.312	87.100	M	438.80	33.562
	3	75.280	0.179	0.610	0.308	86.800	M	178.91	8.843
	4	128.700	0.157	0.270	0.325	86.800	M	311.45	15.173
	5	67.060	0.333	0.000	0.000	82.000	M	107.33	6.237
	Σ	**37,830.160**						**5,069.69**	**3,972.374**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.99	22.00	736.00	1.720	0.118

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.63	66.00	10,511.22	2.370	1.231
#1	**1**	**Time of Concentration:**					**1.349**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	6.24	30.00	481.00	2.490	0.053
		8. Large gullies, diversions, and low flowing streams	3.34	406.00	12,141.00	5.480	0.615
#2	**1**	**Time of Concentration:**					**0.668**
#2	2	5. Nearly bare and untilled, and alluvial valley fans	3.16	30.00	950.00	1.770	0.149
		8. Large gullies, diversions, and low flowing streams	4.22	432.00	10,229.00	6.160	0.461
#2	**2**	**Time of Concentration:**					**0.610**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	2.65	10.00	378.00	1.620	0.064
		8. Large gullies, diversions, and low flowing streams	2.72	234.00	8,592.00	4.950	0.482
#2	**3**	**Time of Concentration:**					**0.546**
#2	4	5. Nearly bare and untilled, and alluvial valley fans	3.07	25.00	815.00	1.750	0.129
		8. Large gullies, diversions, and low flowing streams	3.32	330.00	9,931.00	5.460	0.505
#2	**4**	**Time of Concentration:**					**0.634**
#2	5	5. Nearly bare and untilled, and alluvial valley fans	7.45	45.00	604.00	2.720	0.061
		8. Large gullies, diversions, and low flowing streams	3.78	310.00	8,210.00	5.820	0.391
#2	**5**	**Time of Concentration:**					**0.452**
#2	6	5. Nearly bare and untilled, and alluvial valley fans	9.10	80.00	879.00	3.010	0.081
		8. Large gullies, diversions, and low flowing streams	2.32	344.00	14,831.00	4.560	0.903
#2	**6**	**Time of Concentration:**					**0.984**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	1.29	15.00	1,163.00	1.130	0.285
		8. Large gullies, diversions, and low flowing streams	2.37	338.00	14,280.00	4.610	0.860
#3	**1**	**Time of Concentration:**					**1.145**
#3	2	5. Nearly bare and untilled, and alluvial valley fans	3.04	33.00	1,087.00	1.740	0.173
		8. Large gullies, diversions, and low flowing streams	2.06	238.00	11,527.00	4.310	0.742
#3	**2**	**Time of Concentration:**					**0.915**
#3	3	5. Nearly bare and untilled, and alluvial valley fans	5.02	45.00	897.00	2.230	0.111
		8. Large gullies, diversions, and low flowing streams	3.09	270.00	8,741.00	5.270	0.460
#3	**3**	**Time of Concentration:**					**0.571**
#3	4	5. Nearly bare and untilled, and alluvial valley fans	7.41	28.00	378.00	2.720	0.038

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	3.43	402.00	11,736.00	5.550	0.587
#3	**4**	**Time of Concentration:**					**0.625**
#3	5	5. Nearly bare and untilled, and alluvial valley fans	3.39	30.00	885.00	1.840	0.133
		8. Large gullies, diversions, and low flowing streams	2.58	442.00	17,121.00	4.820	0.986
#3	**5**	**Time of Concentration:**					**1.119**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	3.59	62.00	1,729.00	1.890	0.254
		8. Large gullies, diversions, and low flowing streams	2.09	154.00	7,372.00	4.330	0.472
#4	**1**	**Time of Concentration:**					**0.726**
#4	2	5. Nearly bare and untilled, and alluvial valley fans	6.83	25.00	366.00	2.610	0.038
		8. Large gullies, diversions, and low flowing streams	2.36	182.00	7,708.00	4.600	0.465
#4	**2**	**Time of Concentration:**					**0.503**
#4	3	5. Nearly bare and untilled, and alluvial valley fans	19.03	47.00	247.00	4.360	0.015
		8. Large gullies, diversions, and low flowing streams	2.13	268.00	12,586.00	4.370	0.800
#4	**3**	**Time of Concentration:**					**0.815**
#4	4	5. Nearly bare and untilled, and alluvial valley fans	14.08	50.00	355.00	3.750	0.026
		8. Large gullies, diversions, and low flowing streams	2.46	372.00	15,119.00	4.700	0.893
#4	**4**	**Time of Concentration:**					**0.919**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	12.55	65.00	518.00	3.540	0.040
		8. Large gullies, diversions, and low flowing streams	1.92	184.00	9,592.00	4.150	0.642
#5	**1**	**Time of Concentration:**					**0.682**
#5	2	5. Nearly bare and untilled, and alluvial valley fans	5.10	30.00	588.00	2.250	0.072
		8. Large gullies, diversions, and low flowing streams	1.77	266.00	15,016.00	3.990	1.045
#5	**2**	**Time of Concentration:**					**1.117**
#5	3	5. Nearly bare and untilled, and alluvial valley fans	1.90	20.00	1,050.00	1.380	0.211
		8. Large gullies, diversions, and low flowing streams	2.19	274.00	12,532.00	4.430	0.785
#5	**3**	**Time of Concentration:**					**0.996**
#5	4	5. Nearly bare and untilled, and alluvial valley fans	2.78	32.00	1,152.00	1.660	0.192
		8. Large gullies, diversions, and low flowing streams	0.99	182.00	18,415.00	2.980	1.716
#5	**4**	**Time of Concentration:**					**1.908**
#5	5	5. Nearly bare and untilled, and alluvial valley fans	2.52	23.00	911.00	1.580	0.160

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	1.07	256.00	23,965.00	3.100	2.147
#5	**5**	**Time of Concentration:**					**2.307**
#5	6	5. Nearly bare and untilled, and alluvial valley fans	6.36	25.00	393.00	2.520	0.043
		8. Large gullies, diversions, and low flowing streams	2.39	198.00	8,272.00	4.640	0.495
#5	**6**	**Time of Concentration:**					**0.538**
#5	7	5. Nearly bare and untilled, and alluvial valley fans	9.66	28.00	290.00	3.100	0.025
		8. Large gullies, diversions, and low flowing streams	2.12	179.00	8,427.00	4.370	0.535
#5	**7**	**Time of Concentration:**					**0.560**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	31.83	120.00	377.00	5.640	0.018
		8. Large gullies, diversions, and low flowing streams	1.38	198.00	14,361.00	3.520	1.133
#6	**1**	**Time of Concentration:**					**1.151**
#6	2	5. Nearly bare and untilled, and alluvial valley fans	4.25	40.00	941.00	2.060	0.126
		8. Large gullies, diversions, and low flowing streams	0.96	176.00	18,407.00	2.930	1.745
#6	**2**	**Time of Concentration:**					**1.871**
#6	3	5. Nearly bare and untilled, and alluvial valley fans	4.35	25.00	575.00	2.080	0.076
		8. Large gullies, diversions, and low flowing streams	1.57	224.00	14,223.00	3.760	1.050
#6	**3**	**Time of Concentration:**					**1.126**
#26	1	8. Large gullies, diversions, and low flowing streams	2.35	30.00	1,275.00	4.600	0.076
#26	**1**	**Time of Concentration:**					**0.076**
#27	1	5. Nearly bare and untilled, and alluvial valley fans	2.60	15.60	600.00	1.610	0.103
		8. Large gullies, diversions, and low flowing streams	0.92	32.00	3,493.83	2.870	0.338
#27	**1**	**Time of Concentration:**					**0.441**
#28	1	8. Large gullies, diversions, and low flowing streams	2.92	80.00	2,740.30	5.120	0.148
		8. Large gullies, diversions, and low flowing streams	2.60	105.00	4,042.56	4.830	0.232
#28	**1**	**Time of Concentration:**					**0.380**
#29	1	8. Large gullies, diversions, and low flowing streams	3.69	120.00	3,255.51	5.750	0.157
		8. Large gullies, diversions, and low flowing streams	0.87	8.00	921.20	2.790	0.091
#29	**1**	**Time of Concentration:**					**0.248**
#30	1	5. Nearly bare and untilled, and alluvial valley fans	2.56	42.03	1,642.00	1.590	0.286
		5. Nearly bare and untilled, and alluvial valley fans	1.42	17.99	1,267.00	1.190	0.295

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.94	18.00	1,915.00	2.900	0.183
		8. Large gullies, diversions, and low flowing streams	0.25	1.95	784.00	1.500	0.145
#30	**1**	**Time of Concentration:**					**0.909**
#33	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	9.39	469.50	1.410	0.092
		8. Large gullies, diversions, and low flowing streams	0.50	7.50	1,500.00	2.120	0.196
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#33	**1**	**Time of Concentration:**					**0.291**
#38	1	5. Nearly bare and untilled, and alluvial valley fans	2.50	2.00	80.00	1.580	0.014
		7. Paved area and small upland gullies	4.80	16.03	334.00	4.410	0.021
		7. Paved area and small upland gullies	1.80	27.75	1,542.00	2.700	0.158
		8. Large gullies, diversions, and low flowing streams	1.42	19.99	1,408.00	3.570	0.109
#38	**1**	**Time of Concentration:**					**0.302**
#40	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	13.29	664.53	1.410	0.130
		8. Large gullies, diversions, and low flowing streams	0.30	3.93	1,310.00	1.640	0.221
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#40	**1**	**Time of Concentration:**					**0.354**
#43	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		8. Large gullies, diversions, and low flowing streams	1.50	15.00	1,000.00	3.670	0.075
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#43	**1**	**Time of Concentration:**					**0.137**
#47	1	5. Nearly bare and untilled, and alluvial valley fans	2.33	6.99	300.00	1.520	0.054
		8. Large gullies, diversions, and low flowing streams	3.70	37.00	1,000.00	5.770	0.048
		8. Large gullies, diversions, and low flowing streams	1.87	12.28	657.00	4.100	0.044
#47	**1**	**Time of Concentration:**					**0.146**
#48	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	0.15	1.50	1,000.00	1.160	0.239
#48	**1**	**Time of Concentration:**					**0.301**
#49	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	20.00	1,000.00	1.410	0.197

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.18	4.00	2,201.43	1.270	0.481
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#49	**1**	**Time of Concentration:**					**0.681**
#51	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		8. Large gullies, diversions, and low flowing streams	2.86	12.01	419.94	5.070	0.023
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#51	**1**	**Time of Concentration:**					**0.055**
#54	1	5. Nearly bare and untilled, and alluvial valley fans	2.03	14.00	690.00	1.420	0.134
		8. Large gullies, diversions, and low flowing streams	2.11	20.00	950.00	4.350	0.060
#54	**1**	**Time of Concentration:**					**0.194**
#55	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	2.48	25.54	1,030.00	4.720	0.060
#55	**1**	**Time of Concentration:**					**0.122**
#57	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	1.33	7.98	600.00	3.450	0.048
#57	**1**	**Time of Concentration:**					**0.080**
#59	1	5. Nearly bare and untilled, and alluvial valley fans	0.81	5.00	620.00	0.890	0.193
		8. Large gullies, diversions, and low flowing streams	1.33	21.00	1,580.00	3.450	0.127
#59	**1**	**Time of Concentration:**					**0.320**
#61	1	5. Nearly bare and untilled, and alluvial valley fans	2.71	16.00	590.01	1.640	0.099
		8. Large gullies, diversions, and low flowing streams	1.89	10.00	530.02	4.120	0.035
#61	**1**	**Time of Concentration:**					**0.134**
#65	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	15.00	750.00	1.410	0.147
		9. Small streams flowing bankfull	1.46	29.93	2,050.00	10.870	0.052
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#65	**1**	**Time of Concentration:**					**0.202**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.88	378.00	20,112.80	4.110	1.359
#1	**1**	**Muskingum K:**					**1.359**
#2	1	8. Large gullies, diversions, and low flowing streams	1.44	228.00	15,800.00	3.600	1.219
#2	**1**	**Muskingum K:**					**1.219**
#2	2	8. Large gullies, diversions, and low flowing streams	1.19	202.00	16,912.00	3.270	1.436
#2	**2**	**Muskingum K:**					**1.436**
#2	3	8. Large gullies, diversions, and low flowing streams	1.10	160.00	14,568.00	3.140	1.288
#2	**3**	**Muskingum K:**					**1.288**
#2	4	8. Large gullies, diversions, and low flowing streams	1.09	104.00	9,576.00	3.120	0.852
#2	**4**	**Muskingum K:**					**0.852**
#2	5	8. Large gullies, diversions, and low flowing streams	0.93	44.00	4,715.00	2.890	0.453
#2	**5**	**Muskingum K:**					**0.453**
#3	1	8. Large gullies, diversions, and low flowing streams	1.75	294.00	16,845.00	3.960	1.181
#3	**1**	**Muskingum K:**					**1.181**
#3	2	8. Large gullies, diversions, and low flowing streams	1.79	154.00	8,609.00	4.010	0.596
#3	**2**	**Muskingum K:**					**0.596**
#3	3	8. Large gullies, diversions, and low flowing streams	1.93	92.00	4,778.00	4.160	0.319
#3	**3**	**Muskingum K:**					**0.319**
#4	1	8. Large gullies, diversions, and low flowing streams	1.01	186.00	18,477.00	3.000	1.710
#4	**1**	**Muskingum K:**					**1.710**
#4	2	8. Large gullies, diversions, and low flowing streams	0.98	150.00	15,281.00	2.970	1.429
#4	**2**	**Muskingum K:**					**1.429**
#4	3	8. Large gullies, diversions, and low flowing streams	0.98	104.00	10,645.00	2.960	0.998
#4	**3**	**Muskingum K:**					**0.998**
#5	1	8. Large gullies, diversions, and low flowing streams	0.64	195.00	30,309.00	2.400	3.507
#5	**1**	**Muskingum K:**					**3.507**
#5	2	8. Large gullies, diversions, and low flowing streams	0.60	113.00	18,717.00	2.330	2.231
#5	**2**	**Muskingum K:**					**2.231**
#5	3	8. Large gullies, diversions, and low flowing streams	0.63	85.00	13,541.00	2.370	1.587
#5	**3**	**Muskingum K:**					**1.587**
#5	4	8. Large gullies, diversions, and low flowing streams	0.63	67.00	10,710.00	2.370	1.255
#5	**4**	**Muskingum K:**					**1.255**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	5	8. Large gullies, diversions, and low flowing streams	0.59	53.00	8,978.00	2.300	1.084
#5	**5**	**Muskingum K:**					**1.084**
#5	6	8. Large gullies, diversions, and low flowing streams	0.74	41.00	5,528.00	2.580	0.595
#5	**6**	**Muskingum K:**					**0.595**
#6	1	8. Large gullies, diversions, and low flowing streams	0.94	186.00	19,797.00	2.900	1.896
#6	**1**	**Muskingum K:**					**1.896**
#6	2	8. Large gullies, diversions, and low flowing streams	0.58	8.00	1,372.00	2.290	0.166
#6	**2**	**Muskingum K:**					**0.166**
#27	1	8. Large gullies, diversions, and low flowing streams	0.30	16.15	5,384.09	1.640	0.911
#27	**1**	**Muskingum K:**					**0.000**

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Attachment 26.A-D.3.1.1

Noname watershed

BHP Billiton

Norwest
950 S. Cherry St
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Denver, CO 80246

Phone: 303-782-0164
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General Information

Storm Information:

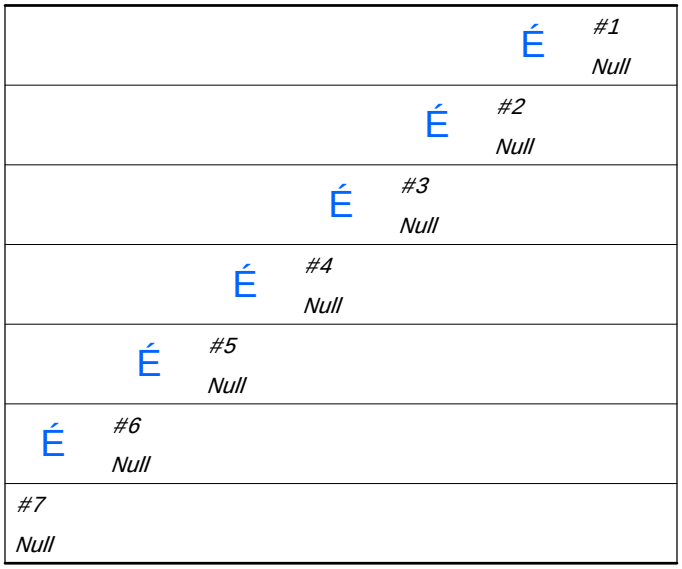
Storm Type:	Type II-70
Design Storm:	10 yr - 6 hr
Rainfall Depth:	1.280 inches

Particle Size Distribution:

Size (mm)	N1	N2	N3	N4	N5	N6	N7
0.4250	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%
0.2500	67.238%	70.939%	74.655%	74.155%	77.281%	75.578%	77.393%
0.1500	49.361%	52.171%	54.870%	54.074%	57.254%	54.286%	57.877%
0.0750	37.563%	37.728%	38.718%	39.358%	43.405%	40.591%	43.197%
0.0159	32.342%	31.597%	32.157%	33.572%	37.974%	35.722%	37.191%
0.0100	24.314%	22.169%	22.246%	25.073%	30.556%	29.049%	28.724%
0.0050	10.387%	8.316%	6.741%	7.496%	7.842%	7.567%	7.539%
0.0020	6.291%	5.386%	4.536%	4.624%	4.493%	4.182%	4.580%
0.0010	5.795%	4.854%	4.004%	4.140%	4.097%	3.764%	4.153%
0.0004	5.371%	4.575%	3.806%	3.867%	3.665%	3.448%	3.748%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	0.814	0.291	SWS01
Null	#2	==>	#3	0.656	0.345	SWS02
Null	#3	==>	#4	0.604	0.309	SWS03, 04, 05
Null	#4	==>	#5	0.096	0.358	SWS06, 07
Null	#5	==>	#6	0.681	0.307	SWS08
Null	#6	==>	#7	1.027	0.307	SWS09, 10, 11, 12, 13, 14
Null	#7	==>	End	0.000	0.000	SWS15, 16, 17, 18, 19



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	0.62	43.00	6,923.00	2.36	0.814
#1	**Muskingum K:**					**0.814**
#2	8. Large gullies, diversions, and low flowing streams	1.59	142.00	8,936.00	3.78	0.656
#2	**Muskingum K:**					**0.656**
#3	8. Large gullies, diversions, and low flowing streams	0.84	50.00	5,964.00	2.74	0.604
#3	**Muskingum K:**					**0.604**
#4	8. Large gullies, diversions, and low flowing streams	2.03	30.00	1,480.00	4.27	0.096
#4	**Muskingum K:**					**0.096**

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	8. Large gullies, diversions, and low flowing streams	0.82	54.00	6,623.00	2.70	0.681
#5	**Muskingum K:**					**0.681**
#6	8. Large gullies, diversions, and low flowing streams	0.82	82.00	10,027.00	2.71	1.027
#6	**Muskingum K:**					**1.027**

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	999.370	999.370	102.78	14.94	162.3	10,997	2.81	2.03
#2	856.430	1,855.800	184.74	34.40	271.1	7,706	1.69	1.26
#3	2,374.080	4,229.880	431.44	100.54	736.4	7,513	1.50	1.07
#4	1,068.640	5,298.520	482.24	128.96	1,218.4	24,741	5.03	1.41
#5	233.280	5,531.800	489.89	135.53	1,341.4	25,514	5.12	1.45
#6	1,164.130	6,695.930	516.86	166.75	1,901.9	25,548	4.74	1.55
#7	648.980	7,344.910	523.87	182.85	2,254.8	31,814	5.63	1.59

Particle Size Distribution(s) at Each Structure

Structure #1 (SWS01):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	100.000%
0.0159	94.064%
0.0100	70.715%
0.0050	30.210%
0.0020	18.297%
0.0010	16.854%
0.0004	15.621%

Structure #2 (SWS02):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	100.000%
0.0159	97.086%
0.0100	75.878%
0.0050	30.669%
0.0020	19.103%
0.0010	17.435%
0.0004	16.274%

Structure #3 (SWS03, 04, 05):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	98.648%
0.0159	94.342%

Size (mm)	In/Out
0.0100	78.989%
0.0050	26.671%
0.0020	16.766%
0.0010	15.104%
0.0004	14.112%

Structure #4 (SWS06, 07):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	93.188%
0.0159	87.701%
0.0100	78.983%
0.0050	24.294%
0.0020	14.909%
0.0010	13.446%
0.0004	12.449%

Structure #5 (SWS08):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	95.396%
0.0159	89.022%
0.0100	79.195%
0.0050	24.036%
0.0020	14.706%
0.0010	13.287%
0.0004	12.253%

Structure #6 (SWS09, 10, 11, 12, 13, 14):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	99.635%
0.0750	92.580%
0.0159	88.105%

Size (mm)	In/Out
0.0100	82.081%
0.0050	23.751%
0.0020	14.250%
0.0010	12.947%
0.0004	11.791%

Structure #7:

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	98.412%
0.0750	94.421%
0.0159	91.163%
0.0100	82.836%
0.0050	23.670%
0.0020	14.093%
0.0010	12.817%
0.0004	11.645%

Structure Detail:

Structure #1 (Null)

SWS01

Structure #2 (Null)

SWS02

Structure #3 (Null)

SWS03, 04, 05

Structure #4 (Null)

SWS06, 07

Structure #5 (Null)

SWS08

Structure #6 (Null)

SWS09, 10, 11, 12, 13, 14

Structure #7 (Null)

SWS15, 16, 17, 18, 19

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	999.370	1.261	0.000	0.000	81.700	M	102.78	14.942
	Σ	**999.370**						**102.78**	**14.942**
#2	1	856.430	1.610	0.000	0.000	85.700	M	114.75	19.453
	Σ	**1,855.800**						**184.74**	**34.395**
#3	1	925.920	1.675	0.409	0.297	88.800	M	165.33	28.342
	2	1,019.220	1.106	0.193	0.261	87.000	M	209.25	26.294
	3	428.940	0.766	0.000	0.000	87.400	M	119.69	11.510
	Σ	**4,229.880**						**431.44**	**100.542**
#4	1	551.860	0.790	0.364	0.292	86.200	M	132.89	13.172
	2	516.780	0.565	0.000	0.000	88.400	M	195.75	15.248
	Σ	**5,298.520**						**482.24**	**128.962**
#5	1	233.280	0.469	0.000	0.000	87.900	M	94.45	6.571
	Σ	**5,531.800**						**489.89**	**135.533**
#6	1	126.980	0.164	0.545	0.308	86.900	M	74.97	3.312
	2	235.630	0.327	0.427	0.341	86.700	M	103.50	5.930
	3	258.380	0.416	0.365	0.294	88.300	M	116.48	7.577
	4	180.930	0.449	0.176	0.301	86.700	M	66.80	4.539
	5	189.850	0.326	0.146	0.330	86.800	M	84.31	4.824
	6	172.360	0.753	0.000	0.000	88.300	M	53.32	5.038
	Σ	**6,695.930**						**516.86**	**166.752**
#7	1	91.450	0.220	0.854	0.310	86.800	M	48.23	2.330
	2	286.490	0.566	0.642	0.312	87.100	M	95.23	7.469
	3	75.280	0.179	0.610	0.308	86.800	M	42.95	1.937
	4	128.700	0.157	0.270	0.325	86.800	M	75.32	3.324
	5	67.060	0.333	0.000	0.000	82.000	M	17.75	1.042
	Σ	**7,344.910**						**523.87**	**182.855**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.233	280.00	2.40	0.2650	1.0000	1	162.3	10,997	2.81	2.03
	Σ							**162.3**	**10,997**	**2.81**	**2.03**

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#2	1	0.245	420.00	1.40	0.2450	1.0000	2	137.5	7,117	2.07	1.51
	Σ							**271.1**	**7,706**	**1.69**	**1.26**
#3	1	0.235	280.00	2.20	0.2330	1.0000	3	248.7	8,790	2.77	2.03
	2	0.204	280.00	2.30	0.2330	1.0000	4	245.8	9,479	3.11	2.25
	3	0.158	240.00	3.80	0.2110	1.0000	5	119.9	10,804	3.36	2.37
	Σ							**736.4**	**7,513**	**1.50**	**1.07**
#4	1	0.150	200.00	6.00	0.2320	1.0000	6	255.5	19,832	6.28	4.49
	2	0.183	100.00	9.10	0.1990	1.0000	7	410.8	28,194	11.15	7.76
	Σ							**1,218.4**	**24,741**	**5.03**	**1.41**
#5	1	0.170	100.00	10.10	0.1890	1.0000	8	181.3	29,219	11.07	7.61
	Σ							**1,341.4**	**25,514**	**5.12**	**1.45**
#6	1	0.160	100.00	11.50	0.1990	1.0000	9	127.8	40,467	18.87	13.06
	2	0.145	100.00	12.00	0.2110	1.0000	15	218.0	38,921	15.93	10.92
	3	0.171	100.00	8.20	0.1850	1.0000	10	152.7	21,192	8.09	5.62
	4	0.150	75.00	12.10	0.2110	1.0000	11	129.5	30,158	11.32	7.80
	5	0.143	75.00	13.30	0.2110	1.0000	15	164.6	36,428	14.94	10.17
	6	0.164	75.00	13.90	0.1850	1.0000	12	139.1	28,432	8.22	5.82
	Σ							**1,901.9**	**25,548**	**4.74**	**1.55**
#7	1	0.143	100.00	10.40	0.2110	1.0000	15	68.0	30,359	13.53	9.47
	2	0.162	75.00	15.20	0.2220	1.0000	13	318.4	43,656	15.97	11.30
	3	0.143	75.00	20.10	0.2110	1.0000	15	111.1	59,686	27.50	19.05
	4	0.143	100.00	8.10	0.2110	1.0000	15	69.8	22,787	10.61	7.14
	5	0.215	100.00	8.20	0.2760	1.0000	14	32.9	34,881	16.08	10.58
	Σ							**2,254.8**	**31,814**	**5.63**	**1.59**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	1.30	9.00	692.00	1.140	0.168
		8. Large gullies, diversions, and low flowing streams	1.35	186.00	13,736.00	3.490	1.093
#1	**1**	**Time of Concentration:**					**1.261**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	1.06	11.00	1,041.00	1.020	0.283
		8. Large gullies, diversions, and low flowing streams	0.41	37.00	9,125.00	1.910	1.327
#2	**1**	**Time of Concentration:**					**1.610**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	0.13	1.00	743.00	0.360	0.573

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.79	84.00	10,596.00	2.670	1.102
#3	**1**	**Time of Concentration:**					**1.675**
#3	2	5. Nearly bare and untilled, and alluvial valley fans	3.79	40.00	1,056.00	1.940	0.151
		8. Large gullies, diversions, and low flowing streams	1.20	135.00	11,282.00	3.280	0.955
#3	**2**	**Time of Concentration:**					**1.106**
#3	3	5. Nearly bare and untilled, and alluvial valley fans	1.48	14.00	945.00	1.210	0.216
		8. Large gullies, diversions, and low flowing streams	1.68	129.00	7,691.00	3.880	0.550
#3	**3**	**Time of Concentration:**					**0.766**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	0.96	7.00	731.00	0.970	0.209
		8. Large gullies, diversions, and low flowing streams	1.94	169.00	8,725.00	4.170	0.581
#4	**1**	**Time of Concentration:**					**0.790**
#4	2	5. Nearly bare and untilled, and alluvial valley fans	4.40	43.00	978.00	2.090	0.129
		8. Large gullies, diversions, and low flowing streams	2.35	170.00	7,224.00	4.600	0.436
#4	**2**	**Time of Concentration:**					**0.565**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	2.11	22.00	1,044.00	1.450	0.200
		8. Large gullies, diversions, and low flowing streams	3.14	162.00	5,158.00	5.310	0.269
#5	**1**	**Time of Concentration:**					**0.469**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	4.94	12.00	243.00	2.220	0.030
		8. Large gullies, diversions, and low flowing streams	4.62	144.00	3,117.00	6.440	0.134
#6	**1**	**Time of Concentration:**					**0.164**
#6	2	5. Nearly bare and untilled, and alluvial valley fans	4.52	46.00	1,017.00	2.120	0.133
		8. Large gullies, diversions, and low flowing streams	3.40	132.00	3,879.00	5.530	0.194
#6	**2**	**Time of Concentration:**					**0.327**
#6	3	5. Nearly bare and untilled, and alluvial valley fans	2.83	23.00	813.00	1.680	0.134
		8. Large gullies, diversions, and low flowing streams	2.68	134.00	4,999.00	4.910	0.282
#6	**3**	**Time of Concentration:**					**0.416**
#6	4	5. Nearly bare and untilled, and alluvial valley fans	4.43	28.00	632.00	2.100	0.083
		8. Large gullies, diversions, and low flowing streams	2.77	182.00	6,575.00	4.990	0.366
#6	**4**	**Time of Concentration:**					**0.449**
#6	5	5. Nearly bare and untilled, and alluvial valley fans	6.63	41.00	618.00	2.570	0.066

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	2.36	102.00	4,321.00	4.600	0.260
#6	**5**	**Time of Concentration:**					**0.326**
#6	6	5. Nearly bare and untilled, and alluvial valley fans	0.41	4.00	979.00	0.630	0.431
		8. Large gullies, diversions, and low flowing streams	2.88	170.00	5,907.00	5.080	0.322
#6	**6**	**Time of Concentration:**					**0.753**
#7	1	5. Nearly bare and untilled, and alluvial valley fans	18.35	60.00	327.00	4.280	0.021
		8. Large gullies, diversions, and low flowing streams	3.36	133.00	3,954.00	5.500	0.199
#7	**1**	**Time of Concentration:**					**0.220**
#7	2	5. Nearly bare and untilled, and alluvial valley fans	2.42	20.00	826.00	1.550	0.148
		8. Large gullies, diversions, and low flowing streams	2.59	188.00	7,257.00	4.820	0.418
#7	**2**	**Time of Concentration:**					**0.566**
#7	3	5. Nearly bare and untilled, and alluvial valley fans	10.34	74.00	716.00	3.210	0.061
		8. Large gullies, diversions, and low flowing streams	4.74	132.00	2,785.00	6.530	0.118
#7	**3**	**Time of Concentration:**					**0.179**
#7	4	5. Nearly bare and untilled, and alluvial valley fans	17.05	37.00	217.00	4.120	0.014
		8. Large gullies, diversions, and low flowing streams	3.52	102.00	2,899.00	5.620	0.143
#7	**4**	**Time of Concentration:**					**0.157**
#7	5	5. Nearly bare and untilled, and alluvial valley fans	0.95	2.00	211.00	0.970	0.060
		8. Large gullies, diversions, and low flowing streams	1.06	32.00	3,028.00	3.080	0.273
#7	**5**	**Time of Concentration:**					**0.333**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	1	8. Large gullies, diversions, and low flowing streams	0.68	25.00	3,656.00	2.480	0.409
#3	**1**	**Muskingum K:**					**0.409**
#3	2	8. Large gullies, diversions, and low flowing streams	0.39	5.00	1,298.00	1.860	0.193
#3	**2**	**Muskingum K:**					**0.193**
#4	1	8. Large gullies, diversions, and low flowing streams	0.64	20.00	3,139.00	2.390	0.364
#4	**1**	**Muskingum K:**					**0.364**
#6	1	8. Large gullies, diversions, and low flowing streams	0.82	44.00	5,337.00	2.720	0.545

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#6	**1**	**Muskingum K:**					**0.545**
#6	2	8. Large gullies, diversions, and low flowing streams	1.47	82.00	5,593.07	3.630	0.427
#6	**2**	**Muskingum K:**					**0.427**
#6	3	8. Large gullies, diversions, and low flowing streams	0.66	21.00	3,199.00	2.430	0.365
#6	**3**	**Muskingum K:**					**0.365**
#6	4	8. Large gullies, diversions, and low flowing streams	0.74	12.00	1,631.00	2.570	0.176
#6	**4**	**Muskingum K:**					**0.176**
#6	6	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#6	**6**	**Muskingum K:**					**0.000**
#7	1	8. Large gullies, diversions, and low flowing streams	0.86	73.00	8,524.00	2.770	0.854
#7	**1**	**Muskingum K:**					**0.854**
#7	2	8. Large gullies, diversions, and low flowing streams	0.89	58.00	6,527.00	2.820	0.642
#7	**2**	**Muskingum K:**					**0.642**
#7	3	8. Large gullies, diversions, and low flowing streams	0.83	50.00	5,997.00	2.730	0.610
#7	**3**	**Muskingum K:**					**0.610**
#7	4	8. Large gullies, diversions, and low flowing streams	1.11	34.00	3,071.00	3.150	0.270
#7	**4**	**Muskingum K:**					**0.270**
#7	5	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#7	**5**	**Muskingum K:**					**0.000**

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Attachment 26.A-D.3.2.1 Noname Watershed w/ Impoundment

Revised BHP File w/ Impoundment

Michael Kendrick

General Information

Storm Information:

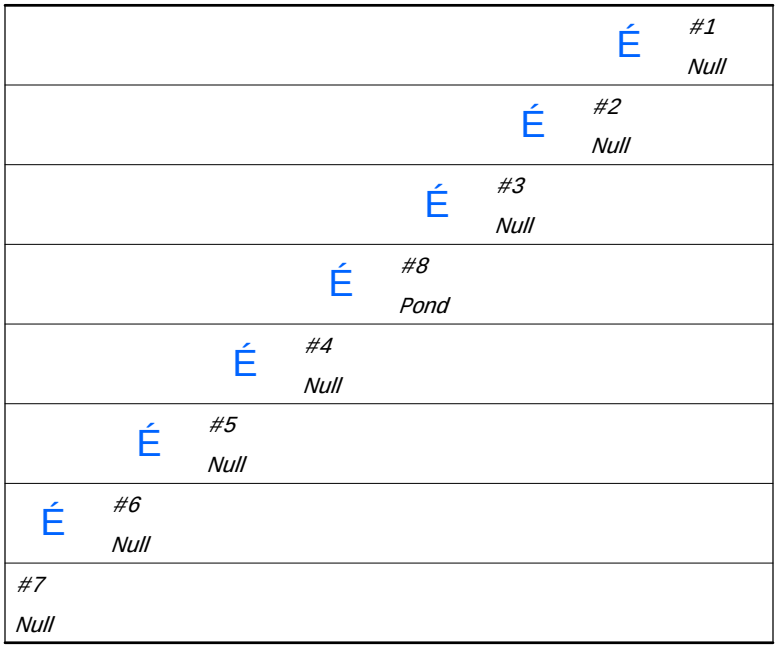
Storm Type:	NRCS TYPE II-70
Design Storm:	10 yr - 6 hr
Rainfall Depth:	1.280 inches

Particle Size Distribution:

Size (mm)	N1	N2	N3	N4	N5	N6	N7
0.4250	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%
0.2500	67.238%	70.939%	74.655%	74.155%	77.281%	75.578%	77.393%
0.1500	49.361%	52.171%	54.870%	54.074%	57.254%	54.286%	57.877%
0.0750	37.563%	37.728%	38.718%	39.358%	43.405%	40.591%	43.197%
0.0159	32.342%	31.597%	32.157%	33.572%	37.974%	35.722%	37.191%
0.0100	24.314%	22.169%	22.246%	25.073%	30.556%	29.049%	28.724%
0.0050	10.387%	8.316%	6.741%	7.496%	7.842%	7.567%	7.539%
0.0020	6.291%	5.386%	4.536%	4.624%	4.493%	4.182%	4.580%
0.0010	5.795%	4.854%	4.004%	4.140%	4.097%	3.764%	4.153%
0.0004	5.371%	4.575%	3.806%	3.867%	3.665%	3.448%	3.748%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	0.814	0.291	SWS01
Null	#2	==>	#3	0.656	0.345	SWS02
Null	#3	==>	#8	0.000	0.000	SWS03, 04, 05
Null	#4	==>	#5	0.096	0.358	SWS06, 07
Null	#5	==>	#6	0.681	0.307	SWS08
Null	#6	==>	#7	1.027	0.307	SWS09, 10, 11, 12, 13, 14
Null	#7	==>	End	0.000	0.000	SWS15, 16, 17, 18, 19
Pond	#8	==>	#4	0.604	0.309	S03 Impoundment Area



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	0.62	43.00	6,923.00	2.36	0.814
#1	**Muskingum K:**					**0.814**
#2	8. Large gullies, diversions, and low flowing streams	1.59	142.00	8,936.00	3.78	0.656
#2	**Muskingum K:**					**0.656**
#4	8. Large gullies, diversions, and low flowing streams	2.03	30.00	1,480.00	4.27	0.096
#4	**Muskingum K:**					**0.096**

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	8. Large gullies, diversions, and low flowing streams	0.82	54.00	6,623.00	2.70	0.681
#5	**Muskingum K:**					**0.681**
#6	8. Large gullies, diversions, and low flowing streams	0.82	82.00	10,027.00	2.71	1.027
#6	**Muskingum K:**					**1.027**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1		999.370	999.370	102.78	14.94	162.3	10,997	2.81	2.03
#2		856.430	1,855.800	184.74	34.40	271.1	7,706	1.69	1.26
#3		2,374.080	4,229.880	431.44	100.54	736.4	7,513	1.50	1.07
#8	In	0.000	4,229.880	431.44	100.54	736.4	7,513	1.50	1.07
	Out			382.13	87.73	532.0	6,367	0.36	0.25
#4		1,068.640	5,298.520	411.91	116.15	958.8	23,926	5.10	1.29
#5		233.280	5,531.800	415.11	122.72	1,080.4	24,656	5.14	1.34
#6		1,164.130	6,695.930	436.61	153.94	1,634.7	24,988	4.84	1.50
#7		648.980	7,344.910	459.56	170.04	2,019.5	31,828	6.13	1.67

Particle Size Distribution(s) at Each Structure

Structure #1 (SWS01):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	100.000%
0.0159	94.064%
0.0100	70.715%
0.0050	30.210%
0.0020	18.297%
0.0010	16.854%
0.0004	15.621%

Structure #2 (SWS02):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	100.000%
0.0159	97.086%
0.0100	75.878%
0.0050	30.669%
0.0020	19.103%
0.0010	17.435%
0.0004	16.274%

Structure #3 (SWS03, 04, 05):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	98.648%
0.0159	94.342%

Size (mm)	In/Out
0.0100	78.989%
0.0050	26.671%
0.0020	16.766%
0.0010	15.104%
0.0004	14.112%

Structure #8 (S03 Impoundment Area):

Size (mm)	In	Out
0.4250	100.000%	100.000%
0.2500	100.000%	100.000%
0.1500	100.000%	100.000%
0.0750	98.648%	100.000%
0.0159	94.342%	100.000%
0.0100	78.989%	100.000%
0.0050	26.671%	36.917%
0.0020	16.766%	23.207%
0.0010	15.104%	20.906%
0.0004	14.112%	19.533%

Structure #4 (SWS06, 07):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	91.343%
0.0159	86.590%
0.0100	76.522%
0.0050	30.872%
0.0020	18.945%
0.0010	17.086%
0.0004	15.819%

Structure #5 (SWS08):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	94.413%
0.0159	88.468%

Size (mm)	In/Out
0.0100	77.164%
0.0050	29.842%
0.0020	18.258%
0.0010	16.497%
0.0004	15.213%

Structure #6 (SWS09, 10, 11, 12, 13, 14):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	99.737%
0.0750	92.474%
0.0159	87.268%
0.0100	80.258%
0.0050	27.634%
0.0020	16.580%
0.0010	15.064%
0.0004	13.719%

Structure #7:

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	98.220%
0.0750	93.756%
0.0159	89.447%
0.0100	80.150%
0.0050	26.428%
0.0020	15.735%
0.0010	14.310%
0.0004	13.002%

Structure Detail:

Structure #1 (Null)

SWS01

Structure #2 (Null)

SWS02

Structure #3 (Null)

SWS03, 04, 05

Structure #8 (Pond)

S03 Impoundment Area

Pond Inputs:

Initial Pool Elev:	5,441.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	5.00 %

**No sediment capacity defined*

Pond Results:

Peak Elevation:	5,448.14 ft
H'graph Detention Time:	1.06 hrs
Pond Model:	CSTRS
Dewater Time:	0.78 days
Trap Efficiency:	27.75 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,441.00	0.000	0.000	0.000		Top of Sed. Storage
5,441.01	0.011	0.000	0.000		
5,442.00	1.075	0.394	0.001		
5,443.00	2.094	1.950	0.001		
5,444.00	2.823	4.399	0.001		
5,445.00	4.127	7.854	0.001		
5,446.00	5.827	12.807	0.001		
5,447.00	7.996	19.691	55.000	15.20	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,448.00	10.478	28.900	300.000	2.70	
5,448.14	11.180	30.620	382.133	0.70	Peak Stage
5,449.00	13.565	40.888	872.600		
5,450.00	16.428	55.862	1,000.000		

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,441.00	0.000	0.000
5,441.01	0.000	0.000
5,442.00	0.001	0.001
5,443.00	0.001	0.001
5,444.00	0.001	0.001
5,445.00	0.001	0.001
5,446.00	0.001	0.001
5,447.00	55.000	55.000
5,448.00	300.000	300.000
5,449.00	872.600	872.600
5,450.00	1,000.000	1,000.000

Structure #4 (Null)

SWS06, 07

Structure #5 (Null)

SWS08

Structure #6 (Null)

SWS09, 10, 11, 12, 13, 14

Structure #7 (Null)

SWS15, 16, 17, 18, 19

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	999.370	1.261	0.000	0.000	81.700	M	102.78	14.942
	Σ	**999.370**						**102.78**	**14.942**
#2	1	856.430	1.610	0.000	0.000	85.700	M	114.75	19.453
	Σ	**1,855.800**						**184.74**	**34.395**
#3	1	925.920	1.675	0.409	0.297	88.800	M	165.33	28.342
	2	1,019.220	1.106	0.193	0.261	87.000	M	209.25	26.294
	3	428.940	0.766	0.000	0.000	87.400	M	119.69	11.510
	Σ	**4,229.880**						**431.44**	**100.542**
#8	**Σ**	**4,229.880**						**431.44**	**100.542**
#4	1	551.860	0.790	0.364	0.292	86.200	M	132.89	13.172
	2	516.780	0.565	0.000	0.000	88.400	M	195.75	15.248
	Σ	**5,298.520**						**411.91**	**116.152**
#5	1	233.280	0.469	0.000	0.000	87.900	M	94.45	6.571
	Σ	**5,531.800**						**415.11**	**122.723**
#6	1	126.980	0.164	0.545	0.308	86.900	M	74.97	3.312
	2	235.630	0.327	0.427	0.341	86.700	M	103.50	5.930
	3	258.380	0.416	0.365	0.294	88.300	M	116.48	7.577
	4	180.930	0.449	0.176	0.301	86.700	M	66.80	4.539
	5	189.850	0.326	0.146	0.330	86.800	M	84.31	4.824
	6	172.360	0.753	0.000	0.000	88.300	M	53.32	5.038
	Σ	**6,695.930**						**436.61**	**153.942**
#7	1	91.450	0.220	0.854	0.310	86.800	M	48.23	2.330
	2	286.490	0.566	0.642	0.312	87.100	M	95.23	7.469
	3	75.280	0.179	0.610	0.308	86.800	M	42.95	1.937
	4	128.700	0.157	0.270	0.325	86.800	M	75.32	3.324
	5	67.060	0.333	0.000	0.000	82.000	M	17.75	1.042
	Σ	**7,344.910**						**459.56**	**170.044**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.233	280.00	2.40	0.2650	1.0000	1	162.3	10,997	2.81	2.03
	Σ							**162.3**	**10,997**	**2.81**	**2.03**
#2	1	0.245	420.00	1.40	0.2450	1.0000	2	137.5	7,117	2.07	1.51
	Σ							**271.1**	**7,706**	**1.69**	**1.26**
#3	1	0.235	280.00	2.20	0.2330	1.0000	3	248.7	8,790	2.77	2.03
	2	0.204	280.00	2.30	0.2330	1.0000	4	245.8	9,479	3.11	2.25
	3	0.158	240.00	3.80	0.2110	1.0000	5	119.9	10,804	3.36	2.37
	Σ							**736.4**	**7,513**	**1.50**	**1.07**
#8	Σ							**736.4**	**7,513**	**1.50**	**1.07**
#4	1	0.150	200.00	6.00	0.2320	1.0000	6	255.5	19,832	6.28	4.49
	2	0.183	100.00	9.10	0.1990	1.0000	7	410.8	28,194	11.15	7.76
	Σ							**958.8**	**23,926**	**5.10**	**1.29**
#5	1	0.170	100.00	10.10	0.1890	1.0000	8	181.3	29,219	11.07	7.61
	Σ							**1,080.4**	**24,656**	**5.14**	**1.34**
#6	1	0.160	100.00	11.50	0.1990	1.0000	9	127.8	40,467	18.87	13.06
	2	0.145	100.00	12.00	0.2110	1.0000	15	218.0	38,921	15.93	10.92
	3	0.171	100.00	8.20	0.1850	1.0000	10	152.7	21,192	8.09	5.62
	4	0.150	75.00	12.10	0.2110	1.0000	11	129.5	30,158	11.32	7.80
	5	0.143	75.00	13.30	0.2110	1.0000	15	164.6	36,428	14.94	10.17
	6	0.164	75.00	13.90	0.1850	1.0000	12	139.1	28,432	8.22	5.82
	Σ							**1,634.7**	**24,988**	**4.84**	**1.50**
#7	1	0.143	100.00	10.40	0.2110	1.0000	15	68.0	30,359	13.53	9.47
	2	0.162	75.00	15.20	0.2220	1.0000	13	318.4	43,656	15.97	11.30
	3	0.143	75.00	20.10	0.2110	1.0000	15	111.1	59,686	27.50	19.05
	4	0.143	100.00	8.10	0.2110	1.0000	15	69.8	22,787	10.61	7.14
	5	0.215	100.00	8.20	0.2760	1.0000	14	32.9	34,881	16.08	10.58
	Σ							**2,019.5**	**31,828**	**6.13**	**1.67**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	1.30	9.00	692.00	1.140	0.168
		8. Large gullies, diversions, and low flowing streams	1.35	186.00	13,736.00	3.490	1.093
#1	**1**	**Time of Concentration:**					**1.261**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	1.06	11.00	1,041.00	1.020	0.283

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.41	37.00	9,125.00	1.910	1.327
#2	**1**	**Time of Concentration:**					**1.610**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	0.13	1.00	743.49	0.360	0.573
		8. Large gullies, diversions, and low flowing streams	0.79	84.00	10,596.69	2.670	1.102
#3	**1**	**Time of Concentration:**					**1.675**
#3	2	5. Nearly bare and untilled, and alluvial valley fans	3.79	40.00	1,056.00	1.940	0.151
		8. Large gullies, diversions, and low flowing streams	1.20	135.00	11,282.00	3.280	0.955
#3	**2**	**Time of Concentration:**					**1.106**
#3	3	5. Nearly bare and untilled, and alluvial valley fans	1.48	14.00	945.00	1.210	0.216
		8. Large gullies, diversions, and low flowing streams	1.68	129.00	7,691.00	3.880	0.550
#3	**3**	**Time of Concentration:**					**0.766**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	0.96	7.00	731.00	0.970	0.209
		8. Large gullies, diversions, and low flowing streams	1.94	169.00	8,725.00	4.170	0.581
#4	**1**	**Time of Concentration:**					**0.790**
#4	2	5. Nearly bare and untilled, and alluvial valley fans	4.40	43.00	978.00	2.090	0.129
		8. Large gullies, diversions, and low flowing streams	2.35	170.00	7,224.00	4.600	0.436
#4	**2**	**Time of Concentration:**					**0.565**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	2.11	22.00	1,044.00	1.450	0.200
		8. Large gullies, diversions, and low flowing streams	3.14	162.00	5,158.00	5.310	0.269
#5	**1**	**Time of Concentration:**					**0.469**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	4.94	12.00	243.00	2.220	0.030
		8. Large gullies, diversions, and low flowing streams	4.62	144.00	3,117.00	6.440	0.134
#6	**1**	**Time of Concentration:**					**0.164**
#6	2	5. Nearly bare and untilled, and alluvial valley fans	4.52	46.00	1,017.00	2.120	0.133
		8. Large gullies, diversions, and low flowing streams	3.40	132.00	3,879.00	5.530	0.194
#6	**2**	**Time of Concentration:**					**0.327**
#6	3	5. Nearly bare and untilled, and alluvial valley fans	2.83	23.00	813.00	1.680	0.134
		8. Large gullies, diversions, and low flowing streams	2.68	134.00	4,999.00	4.910	0.282
#6	**3**	**Time of Concentration:**					**0.416**
#6	4	5. Nearly bare and untilled, and alluvial valley fans	4.43	28.00	632.00	2.100	0.083

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	2.77	182.00	6,575.00	4.990	0.366
#6	**4**	**Time of Concentration:**					**0.449**
#6	5	5. Nearly bare and untilled, and alluvial valley fans	6.63	41.00	618.00	2.570	0.066
		8. Large gullies, diversions, and low flowing streams	2.36	102.00	4,321.00	4.600	0.260
#6	**5**	**Time of Concentration:**					**0.326**
#6	6	5. Nearly bare and untilled, and alluvial valley fans	0.41	4.00	979.00	0.630	0.431
		8. Large gullies, diversions, and low flowing streams	2.88	170.00	5,907.00	5.080	0.322
#6	**6**	**Time of Concentration:**					**0.753**
#7	1	5. Nearly bare and untilled, and alluvial valley fans	18.35	60.00	327.00	4.280	0.021
		8. Large gullies, diversions, and low flowing streams	3.36	133.00	3,954.00	5.500	0.199
#7	**1**	**Time of Concentration:**					**0.220**
#7	2	5. Nearly bare and untilled, and alluvial valley fans	2.42	20.00	826.00	1.550	0.148
		8. Large gullies, diversions, and low flowing streams	2.59	188.00	7,257.00	4.820	0.418
#7	**2**	**Time of Concentration:**					**0.566**
#7	3	5. Nearly bare and untilled, and alluvial valley fans	10.34	74.00	716.00	3.210	0.061
		8. Large gullies, diversions, and low flowing streams	4.74	132.00	2,785.00	6.530	0.118
#7	**3**	**Time of Concentration:**					**0.179**
#7	4	5. Nearly bare and untilled, and alluvial valley fans	17.05	37.00	217.00	4.120	0.014
		8. Large gullies, diversions, and low flowing streams	3.52	102.00	2,899.00	5.620	0.143
#7	**4**	**Time of Concentration:**					**0.157**
#7	5	5. Nearly bare and untilled, and alluvial valley fans	0.95	2.00	211.00	0.970	0.060
		8. Large gullies, diversions, and low flowing streams	1.06	32.00	3,028.00	3.080	0.273
#7	**5**	**Time of Concentration:**					**0.333**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	1	8. Large gullies, diversions, and low flowing streams	0.68	25.00	3,656.00	2.480	0.409
#3	**1**	**Muskingum K:**					**0.409**
#3	2	8. Large gullies, diversions, and low flowing streams	0.39	5.00	1,298.00	1.860	0.193
#3	**2**	**Muskingum K:**					**0.193**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	1	8. Large gullies, diversions, and low flowing streams	0.64	20.00	3,139.00	2.390	0.364
#4	**1**	**Muskingum K:**					**0.364**
#6	1	8. Large gullies, diversions, and low flowing streams	0.82	44.00	5,337.00	2.720	0.545
#6	**1**	**Muskingum K:**					**0.545**
#6	2	8. Large gullies, diversions, and low flowing streams	1.47	82.00	5,593.07	3.630	0.427
#6	**2**	**Muskingum K:**					**0.427**
#6	3	8. Large gullies, diversions, and low flowing streams	0.66	21.00	3,199.00	2.430	0.365
#6	**3**	**Muskingum K:**					**0.365**
#6	4	8. Large gullies, diversions, and low flowing streams	0.74	12.00	1,631.00	2.570	0.176
#6	**4**	**Muskingum K:**					**0.176**
#6	6	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#6	**6**	**Muskingum K:**					**0.000**
#7	1	8. Large gullies, diversions, and low flowing streams	0.86	73.00	8,524.00	2.770	0.854
#7	**1**	**Muskingum K:**					**0.854**
#7	2	8. Large gullies, diversions, and low flowing streams	0.89	58.00	6,527.00	2.820	0.642
#7	**2**	**Muskingum K:**					**0.642**
#7	3	8. Large gullies, diversions, and low flowing streams	0.83	50.00	5,997.00	2.730	0.610
#7	**3**	**Muskingum K:**					**0.610**
#7	4	8. Large gullies, diversions, and low flowing streams	1.11	34.00	3,071.00	3.150	0.270
#7	**4**	**Muskingum K:**					**0.270**
#7	5	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#7	**5**	**Muskingum K:**					**0.000**

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Attachment 26.A-D.3.2.2
Noname Watershed
w/ Impoundment

Revised BHP File w/ Impoundment

Michael Kendrick

General Information

Storm Information:

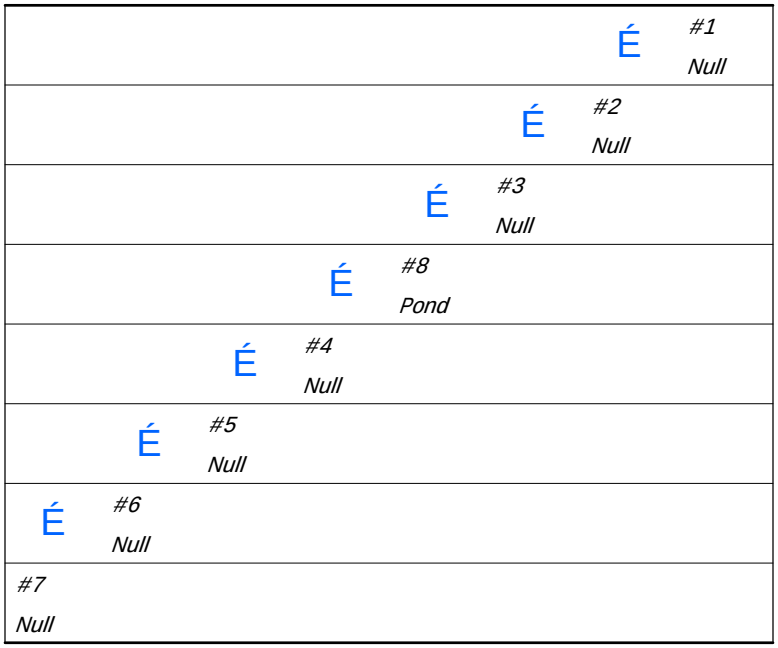
Storm Type:	NRCS TYPE II-70
Design Storm:	100 yr - 6 hr
Rainfall Depth:	2.040 inches

Particle Size Distribution:

Size (mm)	N1	N2	N3	N4	N5	N6	N7
0.4250	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%
0.2500	67.238%	70.939%	74.655%	74.155%	77.281%	75.578%	77.393%
0.1500	49.361%	52.171%	54.870%	54.074%	57.254%	54.286%	57.877%
0.0750	37.563%	37.728%	38.718%	39.358%	43.405%	40.591%	43.197%
0.0159	32.342%	31.597%	32.157%	33.572%	37.974%	35.722%	37.191%
0.0100	24.314%	22.169%	22.246%	25.073%	30.556%	29.049%	28.724%
0.0050	10.387%	8.316%	6.741%	7.496%	7.842%	7.567%	7.539%
0.0020	6.291%	5.386%	4.536%	4.624%	4.493%	4.182%	4.580%
0.0010	5.795%	4.854%	4.004%	4.140%	4.097%	3.764%	4.153%
0.0004	5.371%	4.575%	3.806%	3.867%	3.665%	3.448%	3.748%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	0.814	0.291	SWS01
Null	#2	==>	#3	0.656	0.345	SWS02
Null	#3	==>	#8	0.000	0.000	SWS03, 04, 05
Null	#4	==>	#5	0.096	0.358	SWS06, 07
Null	#5	==>	#6	0.681	0.307	SWS08
Null	#6	==>	#7	1.027	0.307	SWS09, 10, 11, 12, 13, 14
Null	#7	==>	End	0.000	0.000	SWS15, 16, 17, 18, 19
Pond	#8	==>	#4	0.604	0.309	S03 Impoundment Area



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	0.62	43.00	6,923.00	2.36	0.814
#1	**Muskingum K:**					**0.814**
#2	8. Large gullies, diversions, and low flowing streams	1.59	142.00	8,936.00	3.78	0.656
#2	**Muskingum K:**					**0.656**
#4	8. Large gullies, diversions, and low flowing streams	2.03	30.00	1,480.00	4.27	0.096
#4	**Muskingum K:**					**0.096**

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	8. Large gullies, diversions, and low flowing streams	0.82	54.00	6,623.00	2.70	0.681
#5	**Muskingum K:**					**0.681**
#6	8. Large gullies, diversions, and low flowing streams	0.82	82.00	10,027.00	2.71	1.027
#6	**Muskingum K:**					**1.027**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1		999.370	999.370	317.38	43.86	557.8	12,883	4.07	2.94
#2		856.430	1,855.800	522.95	92.86	868.3	9,277	2.60	1.92
#3		2,374.080	4,229.880	1,050.99	247.96	2,028.7	8,385	1.92	1.37
#8	In	0.000	4,229.880	1,050.99	247.96	2,028.7	8,385	1.92	1.37
	Out			934.11	235.15	1,646.4	7,047	0.73	0.53
#4		1,068.640	5,298.520	1,010.93	302.85	2,775.0	26,217	5.95	1.52
#5		233.280	5,531.800	1,021.67	318.22	3,091.3	27,184	6.14	1.60
#6		1,164.130	6,695.930	1,068.25	392.52	4,543.6	27,354	5.75	1.78
#7		648.980	7,344.910	1,114.89	431.90	5,564.1	34,562	7.33	1.99

Particle Size Distribution(s) at Each Structure

Structure #1 (SWS01):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	96.823%
0.0159	83.366%
0.0100	62.672%
0.0050	26.774%
0.0020	16.216%
0.0010	14.937%
0.0004	13.844%

Structure #2 (SWS02):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	100.000%
0.0159	92.337%
0.0100	67.472%
0.0050	27.407%
0.0020	17.028%
0.0010	15.554%
0.0004	14.509%

Structure #3 (SWS03, 04, 05):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	100.000%
0.0750	97.210%
0.0159	91.250%

Size (mm)	In/Out
0.0100	75.045%
0.0050	25.211%
0.0020	15.807%
0.0010	14.261%
0.0004	13.317%

Structure #8 (S03 Impoundment Area):

Size (mm)	In	Out
0.4250	100.000%	100.000%
0.2500	100.000%	100.000%
0.1500	100.000%	100.000%
0.0750	97.210%	100.000%
0.0159	91.250%	100.000%
0.0100	75.045%	92.471%
0.0050	25.211%	31.065%
0.0020	15.807%	19.478%
0.0010	14.261%	17.572%
0.0004	13.317%	16.409%

Structure #4 (SWS06, 07):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	99.492%
0.0750	89.991%
0.0159	84.146%
0.0100	75.229%
0.0050	27.207%
0.0020	16.674%
0.0010	15.052%
0.0004	13.937%

Structure #5 (SWS08):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	99.338%
0.0750	92.020%
0.0159	85.320%

Size (mm)	In/Out
0.0100	75.322%
0.0050	26.482%
0.0020	16.185%
0.0010	14.635%
0.0004	13.500%

Structure #6 (SWS09, 10, 11, 12, 13, 14):

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	98.957%
0.0750	89.685%
0.0159	85.088%
0.0100	78.290%
0.0050	25.012%
0.0020	14.999%
0.0010	13.633%
0.0004	12.423%

Structure #7:

Size (mm)	In/Out
0.4250	100.000%
0.2500	100.000%
0.1500	97.669%
0.0750	92.416%
0.0159	86.608%
0.0100	77.752%
0.0050	24.137%
0.0020	14.366%
0.0010	13.069%
0.0004	11.881%

Structure Detail:

Structure #1 (Null)

SWS01

Structure #2 (Null)

SWS02

Structure #3 (Null)

SWS03, 04, 05

Structure #8 (Pond)

S03 Impoundment Area

Pond Inputs:

Initial Pool Elev:	5,441.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	5.00 %

**No sediment capacity defined*

Pond Results:

Peak Elevation:	5,449.48 ft
H'graph Detention Time:	0.65 hrs
Pond Model:	CSTRS
Dewater Time:	0.80 days
Trap Efficiency:	18.84 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,441.00	0.000	0.000	0.000		Top of Sed. Storage
5,441.01	0.011	0.000	0.000		
5,442.00	1.075	0.394	0.001		
5,443.00	2.094	1.950	0.001		
5,444.00	2.823	4.399	0.001		
5,445.00	4.127	7.854	0.001		
5,446.00	5.827	12.807	0.001		
5,447.00	7.996	19.691	55.000	14.75	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,448.00	10.478	28.900	300.000	2.80	
5,449.00	13.565	40.888	872.600	1.05	
5,449.48	14.889	48.118	934.110	0.65	Peak Stage
5,450.00	16.428	55.862	1,000.000		

Detailed Discharge Table

Elevation (ft)	User-input discharge (cfs)	Combined Total Discharge (cfs)
5,441.00	0.000	0.000
5,441.01	0.000	0.000
5,442.00	0.001	0.001
5,443.00	0.001	0.001
5,444.00	0.001	0.001
5,445.00	0.001	0.001
5,446.00	0.001	0.001
5,447.00	55.000	55.000
5,448.00	300.000	300.000
5,449.00	872.600	872.600
5,450.00	1,000.000	1,000.000

Structure #4 (Null)

SWS06, 07

Structure #5 (Null)

SWS08

Structure #6 (Null)

SWS09, 10, 11, 12, 13, 14

Structure #7 (Null)

SWS15, 16, 17, 18, 19

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	999.370	1.261	0.000	0.000	81.700	M	317.38	43.857
	Σ	**999.370**						**317.38**	**43.857**
#2	1	856.430	1.610	0.000	0.000	85.700	M	298.08	49.005
	Σ	**1,855.800**						**522.95**	**92.862**
#3	1	925.920	1.675	0.409	0.297	88.800	M	383.46	64.381
	2	1,019.220	1.106	0.193	0.261	87.000	M	518.03	63.355
	3	428.940	0.766	0.000	0.000	87.400	M	290.44	27.365
	Σ	**4,229.880**						**1,050.99**	**247.964**
#8	**Σ**	**4,229.880**						**1,050.99**	**247.964**
#4	1	551.860	0.790	0.364	0.292	86.200	M	338.18	32.612
	2	516.780	0.565	0.000	0.000	88.400	M	457.39	35.086
	Σ	**5,298.520**						**1,010.93**	**302.848**
#5	1	233.280	0.469	0.000	0.000	87.900	M	223.48	15.368
	Σ	**5,531.800**						**1,021.67**	**318.216**
#6	1	126.980	0.164	0.545	0.308	86.900	M	171.89	8.007
	2	235.630	0.327	0.427	0.341	86.700	M	250.67	14.433
	3	258.380	0.416	0.365	0.294	88.300	M	270.95	17.491
	4	180.930	0.449	0.176	0.301	86.700	M	164.46	11.048
	5	189.850	0.326	0.146	0.330	86.800	M	203.46	11.701
	6	172.360	0.753	0.000	0.000	88.300	M	125.38	11.629
	Σ	**6,695.930**						**1,068.25**	**392.525**
#7	1	91.450	0.220	0.854	0.310	86.800	M	112.63	5.652
	2	286.490	0.566	0.642	0.312	87.100	M	232.68	17.936
	3	75.280	0.179	0.610	0.308	86.800	M	98.97	4.700
	4	128.700	0.157	0.270	0.325	86.800	M	173.30	8.064
	5	67.060	0.333	0.000	0.000	82.000	M	52.00	3.019
	Σ	**7,344.910**						**1,114.89**	**431.896**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.233	280.00	2.40	0.2650	1.0000	1	557.8	12,883	4.07	2.94
	Σ							**557.8**	**12,883**	**4.07**	**2.94**
#2	1	0.245	420.00	1.40	0.2450	1.0000	2	393.6	8,095	2.73	1.99
	Σ							**868.3**	**9,277**	**2.60**	**1.92**
#3	1	0.235	280.00	2.20	0.2330	1.0000	3	630.8	9,815	3.46	2.53
	2	0.204	280.00	2.30	0.2330	1.0000	4	668.2	10,668	3.93	2.85
	3	0.158	240.00	3.80	0.2110	1.0000	5	320.0	12,023	4.20	2.99
	Σ							**2,028.7**	**8,385**	**1.92**	**1.37**
#8	Σ							**2,028.7**	**8,385**	**1.92**	**1.37**
#4	1	0.150	200.00	6.00	0.2320	1.0000	6	716.4	22,372	8.00	5.73
	2	0.183	100.00	9.10	0.1990	1.0000	7	1,053.6	31,083	13.20	9.28
	Σ							**2,775.0**	**26,217**	**5.95**	**1.52**
#5	1	0.170	100.00	10.10	0.1890	1.0000	8	472.6	32,119	13.13	9.15
	Σ							**3,091.3**	**27,184**	**6.14**	**1.60**
#6	1	0.160	100.00	11.50	0.1990	1.0000	9	333.5	42,749	20.56	14.52
	2	0.145	100.00	12.00	0.2110	1.0000	15	588.7	42,282	18.47	12.92
	3	0.171	100.00	8.20	0.1850	1.0000	10	391.4	23,197	9.53	6.71
	4	0.150	75.00	12.10	0.2110	1.0000	11	353.0	33,284	13.60	9.50
	5	0.143	75.00	13.30	0.2110	1.0000	15	442.8	39,676	17.36	12.02
	6	0.164	75.00	13.90	0.1850	1.0000	12	358.8	31,478	10.31	7.35
	Σ							**4,543.6**	**27,354**	**5.75**	**1.78**
#7	1	0.143	100.00	10.40	0.2110	1.0000	15	179.6	32,451	15.07	10.73
	2	0.162	75.00	15.20	0.2220	1.0000	13	857.6	48,543	19.37	13.81
	3	0.143	75.00	20.10	0.2110	1.0000	15	291.2	62,925	29.97	21.25
	4	0.143	100.00	8.10	0.2110	1.0000	15	182.9	23,798	11.43	7.95
	5	0.215	100.00	8.20	0.2760	1.0000	14	108.9	38,630	18.98	12.87
	Σ							**5,564.1**	**34,562**	**7.33**	**1.99**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	1.30	9.00	692.00	1.140	0.168
		8. Large gullies, diversions, and low flowing streams	1.35	186.00	13,736.00	3.490	1.093
#1	**1**	**Time of Concentration:**					**1.261**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	1.06	11.00	1,041.00	1.020	0.283

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	0.41	37.00	9,125.00	1.910	1.327
#2	**1**	**Time of Concentration:**					**1.610**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	0.13	1.00	743.49	0.360	0.573
		8. Large gullies, diversions, and low flowing streams	0.79	84.00	10,596.69	2.670	1.102
#3	**1**	**Time of Concentration:**					**1.675**
#3	2	5. Nearly bare and untilled, and alluvial valley fans	3.79	40.00	1,056.00	1.940	0.151
		8. Large gullies, diversions, and low flowing streams	1.20	135.00	11,282.00	3.280	0.955
#3	**2**	**Time of Concentration:**					**1.106**
#3	3	5. Nearly bare and untilled, and alluvial valley fans	1.48	14.00	945.00	1.210	0.216
		8. Large gullies, diversions, and low flowing streams	1.68	129.00	7,691.00	3.880	0.550
#3	**3**	**Time of Concentration:**					**0.766**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	0.96	7.00	731.00	0.970	0.209
		8. Large gullies, diversions, and low flowing streams	1.94	169.00	8,725.00	4.170	0.581
#4	**1**	**Time of Concentration:**					**0.790**
#4	2	5. Nearly bare and untilled, and alluvial valley fans	4.40	43.00	978.00	2.090	0.129
		8. Large gullies, diversions, and low flowing streams	2.35	170.00	7,224.00	4.600	0.436
#4	**2**	**Time of Concentration:**					**0.565**
#5	1	5. Nearly bare and untilled, and alluvial valley fans	2.11	22.00	1,044.00	1.450	0.200
		8. Large gullies, diversions, and low flowing streams	3.14	162.00	5,158.00	5.310	0.269
#5	**1**	**Time of Concentration:**					**0.469**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	4.94	12.00	243.00	2.220	0.030
		8. Large gullies, diversions, and low flowing streams	4.62	144.00	3,117.00	6.440	0.134
#6	**1**	**Time of Concentration:**					**0.164**
#6	2	5. Nearly bare and untilled, and alluvial valley fans	4.52	46.00	1,017.00	2.120	0.133
		8. Large gullies, diversions, and low flowing streams	3.40	132.00	3,879.00	5.530	0.194
#6	**2**	**Time of Concentration:**					**0.327**
#6	3	5. Nearly bare and untilled, and alluvial valley fans	2.83	23.00	813.00	1.680	0.134
		8. Large gullies, diversions, and low flowing streams	2.68	134.00	4,999.00	4.910	0.282
#6	**3**	**Time of Concentration:**					**0.416**
#6	4	5. Nearly bare and untilled, and alluvial valley fans	4.43	28.00	632.00	2.100	0.083

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	2.77	182.00	6,575.00	4.990	0.366
#6	**4**	**Time of Concentration:**					**0.449**
#6	5	5. Nearly bare and untilled, and alluvial valley fans	6.63	41.00	618.00	2.570	0.066
		8. Large gullies, diversions, and low flowing streams	2.36	102.00	4,321.00	4.600	0.260
#6	**5**	**Time of Concentration:**					**0.326**
#6	6	5. Nearly bare and untilled, and alluvial valley fans	0.41	4.00	979.00	0.630	0.431
		8. Large gullies, diversions, and low flowing streams	2.88	170.00	5,907.00	5.080	0.322
#6	**6**	**Time of Concentration:**					**0.753**
#7	1	5. Nearly bare and untilled, and alluvial valley fans	18.35	60.00	327.00	4.280	0.021
		8. Large gullies, diversions, and low flowing streams	3.36	133.00	3,954.00	5.500	0.199
#7	**1**	**Time of Concentration:**					**0.220**
#7	2	5. Nearly bare and untilled, and alluvial valley fans	2.42	20.00	826.00	1.550	0.148
		8. Large gullies, diversions, and low flowing streams	2.59	188.00	7,257.00	4.820	0.418
#7	**2**	**Time of Concentration:**					**0.566**
#7	3	5. Nearly bare and untilled, and alluvial valley fans	10.34	74.00	716.00	3.210	0.061
		8. Large gullies, diversions, and low flowing streams	4.74	132.00	2,785.00	6.530	0.118
#7	**3**	**Time of Concentration:**					**0.179**
#7	4	5. Nearly bare and untilled, and alluvial valley fans	17.05	37.00	217.00	4.120	0.014
		8. Large gullies, diversions, and low flowing streams	3.52	102.00	2,899.00	5.620	0.143
#7	**4**	**Time of Concentration:**					**0.157**
#7	5	5. Nearly bare and untilled, and alluvial valley fans	0.95	2.00	211.00	0.970	0.060
		8. Large gullies, diversions, and low flowing streams	1.06	32.00	3,028.00	3.080	0.273
#7	**5**	**Time of Concentration:**					**0.333**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	1	8. Large gullies, diversions, and low flowing streams	0.68	25.00	3,656.00	2.480	0.409
#3	**1**	**Muskingum K:**					**0.409**
#3	2	8. Large gullies, diversions, and low flowing streams	0.39	5.00	1,298.00	1.860	0.193
#3	**2**	**Muskingum K:**					**0.193**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	1	8. Large gullies, diversions, and low flowing streams	0.64	20.00	3,139.00	2.390	0.364
#4	**1**	**Muskingum K:**					**0.364**
#6	1	8. Large gullies, diversions, and low flowing streams	0.82	44.00	5,337.00	2.720	0.545
#6	**1**	**Muskingum K:**					**0.545**
#6	2	8. Large gullies, diversions, and low flowing streams	1.47	82.00	5,593.07	3.630	0.427
#6	**2**	**Muskingum K:**					**0.427**
#6	3	8. Large gullies, diversions, and low flowing streams	0.66	21.00	3,199.00	2.430	0.365
#6	**3**	**Muskingum K:**					**0.365**
#6	4	8. Large gullies, diversions, and low flowing streams	0.74	12.00	1,631.00	2.570	0.176
#6	**4**	**Muskingum K:**					**0.176**
#6	6	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#6	**6**	**Muskingum K:**					**0.000**
#7	1	8. Large gullies, diversions, and low flowing streams	0.86	73.00	8,524.00	2.770	0.854
#7	**1**	**Muskingum K:**					**0.854**
#7	2	8. Large gullies, diversions, and low flowing streams	0.89	58.00	6,527.00	2.820	0.642
#7	**2**	**Muskingum K:**					**0.642**
#7	3	8. Large gullies, diversions, and low flowing streams	0.83	50.00	5,997.00	2.730	0.610
#7	**3**	**Muskingum K:**					**0.610**
#7	4	8. Large gullies, diversions, and low flowing streams	1.11	34.00	3,071.00	3.150	0.270
#7	**4**	**Muskingum K:**					**0.270**
#7	5	8. Large gullies, diversions, and low flowing streams	0.00	0.00	0.00	0.000	0.000
#7	**5**	**Muskingum K:**					**0.000**

ATTACHMENT 26.A-E SEDCAD REPORTS- DRAINAGE, EROSION AND SEDIMENT CONTROL

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Attachment 26.A-E.1.1
Pinabete Diversion
Drainage and Sediment Control Plan
Watershed 1 (WS1)

Ditch and berm/pond outlet designs

10-yr, 24 hour precipitation event 1.7inches

CBEGEJ

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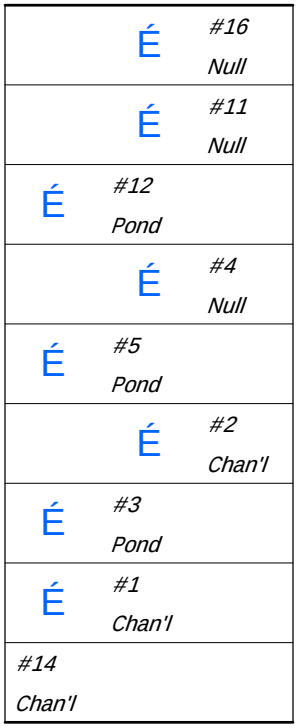
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.700 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#14	0.026	0.412	WS 1-1 & DD1-2
Channel	#2	==>	#3	0.025	0.306	MS 1-1 & DD1-1
Pond	#3	==>	#14	0.026	0.412	CB 1-1
Null	#4	==>	#5	0.000	0.000	TDS 5
Pond	#5	==>	#14	0.026	0.412	CB 1-2
Null	#11	==>	#12	0.000	0.000	MS 1-2
Pond	#12	==>	#14	0.000	0.000	POND 1-1
Channel	#14	==>	End	0.000	0.000	RAMP DITCH 1
Null	#16	==>	#12	0.000	0.000	DD1-3



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#1	**Muskingum K:**					**0.026**
#2	8. Large gullies, diversions, and low flowing streams	0.80	2.00	250.00	2.68	0.025
#2	**Muskingum K:**					**0.025**

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#3	**Muskingum K:**					**0.026**
#5	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#5	**Muskingum K:**					**0.026**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#16		6.350	6.350	4.53	0.27
#11		22.110	22.110	16.75	1.16
#12	In	0.000	28.460	20.82	1.43
	Out			0.16	0.15
#4		4.740	4.740	4.51	0.17
#5	In	0.000	4.740	4.51	0.17
	Out			2.21	0.17
#2		4.870	4.870	7.22	0.32
#3	In	0.000	4.870	7.22	0.32
	Out			7.13	0.32
#1		42.850	42.850	30.89	1.83
#14		0.000	80.920	36.37	2.48

Structure Detail:

Structure #16 (Null)

DD1-3

Structure #11 (Null)

MS 1-2

Structure #12 (Pond)

POND 1-1

Pond Inputs:

Initial Pool Elev:	5,447.00 ft
Initial Pool:	2.01 ac-ft

Pond Results:

Peak Elevation:	5,449.05 ft
Dewater Time:	0.60 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,442.00	0.260	0.000	0.000		
5,442.50	0.285	0.136	0.000		
5,443.00	0.311	0.285	0.000		
5,443.50	0.338	0.448	0.000		
5,444.00	0.367	0.624	0.000		
5,444.50	0.396	0.815	0.000		
5,445.00	0.427	1.021	0.000		
5,445.50	0.459	1.242	0.000		
5,446.00	0.492	1.480	0.000		
5,446.50	0.526	1.734	0.000		
5,447.00	0.562	2.006	0.000		
5,447.50	0.598	2.296	0.000		
5,448.00	0.636	2.605	0.000		
5,448.50	0.675	2.932	0.000		
5,449.00	0.714	3.280	0.000		
5,449.05	0.719	3.320	0.163	14.30	Peak Stage
5,449.50	0.755	3.647	1.486		
5,450.00	0.798	4.035	4.189		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,450.50	0.841	4.445	7.695	
5,451.00	0.886	4.876	11.847	
5,451.50	0.931	5.331	16.175	
5,452.00	0.978	5.808	17.998	

Detailed Discharge Table

Elevation (ft)	Combined Total Discharge (cfs)
5,442.00	0.000
5,442.50	0.000
5,443.00	0.000
5,443.50	0.000
5,444.00	0.000
5,444.50	0.000
5,445.00	0.000
5,445.50	0.000
5,446.00	0.000
5,446.50	0.000
5,447.00	0.000
5,447.50	0.000
5,448.00	0.000
5,448.50	0.000
5,449.00	0.000
5,449.50	1.486
5,450.00	4.189
5,450.50	7.695
5,451.00	11.847
5,451.50	16.175
5,452.00	17.998

Structure #4 (Null)

TDS 5

Structure #5 (Pond)

CB 1-2

Pond Inputs:

Initial Pool Elev:	5,451.50 ft
Initial Pool:	0.41 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,451.79 ft
Dewater Time:	0.76 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,449.00	0.150	0.000	0.000		
5,449.50	0.156	0.076	0.000		
5,450.00	0.162	0.156	0.000		
5,450.50	0.168	0.238	0.000		
5,451.00	0.174	0.324	0.000		
5,451.50	0.180	0.412	0.000		Spillway #1
5,451.79	0.184	0.465	2.214	18.35	Peak Stage
5,452.00	0.187	0.504	3.871		
5,452.50	0.193	0.599	51.179		
5,453.00	0.200	0.698	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #2 (Erodible Channel)

MS 1-1 & DD1-1

Triangular Erodible Channel Inputs:

Material: Cobbles and shingles

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	1.9	0.0350	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	7.22 cfs	
Depth:	0.86 ft	1.86 ft
Top Width:	5.17 ft	11.17 ft
Velocity:	3.23 fps	
X-Section Area:	2.23 sq ft	
Hydraulic Radius:	0.409 ft	
Froude Number:	0.87	

Structure #3 (Pond)

CB 1-1

Pond Inputs:

Initial Pool Elev:	5,451.50 ft
Initial Pool:	0.46 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,452.03 ft
Dewater Time:	0.77 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,448.00	0.100	0.000	0.000	
5,448.50	0.108	0.052	0.000	
5,449.00	0.117	0.109	0.000	
5,449.50	0.126	0.169	0.000	
5,450.00	0.136	0.235	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,450.50	0.146	0.305	0.000		
5,451.00	0.156	0.381	0.000		
5,451.50	0.166	0.461	0.000		Spillway #1
5,452.00	0.177	0.547	3.871	18.40	
5,452.03	0.178	0.554	7.129	0.05	Peak Stage
5,452.50	0.188	0.639	51.179		
5,453.00	0.200	0.736	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #1 (Erodible Channel)

WS 1-1 & DD1-2

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.3	0.0350	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	30.89 cfs	
Depth:	0.68 ft	1.68 ft
Top Width:	14.72 ft	18.72 ft
Velocity:	3.40 fps	

	w/o Freeboard	w/ Freeboard
X-Section Area:	9.08 sq ft	
Hydraulic Radius:	0.604 ft	
Froude Number:	0.76	

Structure #14 (Riprap Channel)

RAMP DITCH 1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	36.37 cfs	
Depth:	0.34 ft	1.34 ft
Top Width:	13.36 ft	17.36 ft
Velocity*:		
X-Section Area:	4.30 sq ft	
Hydraulic Radius:	0.318 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#16	1	6.350	0.199	0.000	0.000	86.200	M	4.53	0.270
	Σ	**6.350**						**4.53**	**0.270**
#11	1	22.110	0.307	0.000	0.000	89.000	M	16.75	1.157
	Σ	**22.110**						**16.75**	**1.157**
#12	Σ	**28.460**						**20.82**	**1.427**
#4	1	4.740	0.080	0.000	0.000	81.500	M	4.51	0.174
	Σ	**4.740**						**4.51**	**0.174**
#5	Σ	**4.740**						**4.51**	**0.174**
#2	1	4.870	0.118	0.000	0.000	89.000	M	7.22	0.318
	Σ	**4.870**						**7.22**	**0.318**
#3	Σ	**4.870**						**7.22**	**0.318**
#1	1	42.850	0.194	0.000	0.000	86.200	M	30.89	1.830
	Σ	**42.850**						**30.89**	**1.830**
#14	Σ	**80.920**						**36.37**	**2.476**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.03	14.00	690.00	1.420	0.134
		8. Large gullies, diversions, and low flowing streams	2.11	20.00	950.00	4.350	0.060
#1	**1**	**Time of Concentration:**					**0.194**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		8. Large gullies, diversions, and low flowing streams	2.48	24.00	966.02	4.720	0.056
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#2	**1**	**Time of Concentration:**					**0.118**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		8. Large gullies, diversions, and low flowing streams	1.33	8.00	600.00	3.460	0.048
		7. Paved area and small upland gullies	33.00	44.88	136.00	11.560	0.003

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	**1**	**Time of Concentration:**					**0.080**
#11	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	15.00	750.00	1.410	0.147
		8. Large gullies, diversions, and low flowing streams	1.46	30.00	2,050.00	3.620	0.157
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#11	**1**	**Time of Concentration:**					**0.307**
#16	1	3. Short grass pasture	2.20	5.00	227.00	1.180	0.053
		6. Grassed waterway	2.40	20.00	833.05	2.320	0.099
		7. Paved area and small upland gullies	2.04	10.00	489.02	2.870	0.047
#16	**1**	**Time of Concentration:**					**0.199**

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Attachment 26.A-E.1.2
Pinabete Diversion
Drainage and Sediment Control Plan
Watershed 1 (WS1)

Ditch and berm/pond outlet designs

25-yr, 6- hour precipitation event 1.56 inches

CBEGEJ

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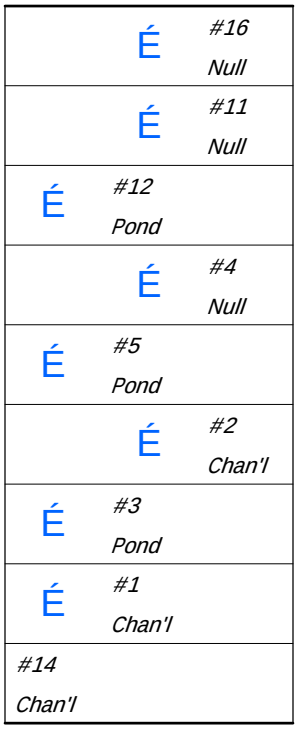
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	25 yr - 6 hr
Rainfall Depth:	1.560 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#14	0.026	0.412	WS 1-1 & DD1-2
Channel	#2	==>	#3	0.025	0.306	MS 1-1 & DD1-1
Pond	#3	==>	#14	0.026	0.412	CB 1-1
Null	#4	==>	#5	0.000	0.000	TDS 5
Pond	#5	==>	#14	0.026	0.412	CB 1-2
Null	#11	==>	#12	0.000	0.000	MS 1-2
Pond	#12	==>	#14	0.000	0.000	POND 1-1
Channel	#14	==>	End	0.000	0.000	RAMP DITCH 1
Null	#16	==>	#12	0.000	0.000	DD1-3



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#1	**Muskingum K:**					**0.026**
#2	8. Large gullies, diversions, and low flowing streams	0.80	2.00	250.00	2.68	0.025
#2	**Muskingum K:**					**0.025**

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Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#3	**Muskingum K:**					**0.026**
#5	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#5	**Muskingum K:**					**0.026**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#16		6.350	6.350	4.85	0.23
#11		22.110	22.110	17.78	1.00
#12	In	0.000	28.460	22.15	1.23
	Out			0.00	0.00
#4		4.740	4.740	4.92	0.14
#5	In	0.000	4.740	4.92	0.14
	Out			2.36	0.14
#2		4.870	4.870	7.80	0.27
#3	In	0.000	4.870	7.80	0.27
	Out			7.67	0.27
#1		42.850	42.850	33.09	1.55
#14		0.000	80.920	38.84	1.97

Structure Detail:

Structure #16 (Null)

DD1-3

Structure #11 (Null)

MS 1-2

Structure #12 (Pond)

POND 1-1

Pond Inputs:

Initial Pool Elev:	5,447.00 ft
Initial Pool:	2.01 ac-ft

Pond Results:

Peak Elevation:	5,448.93 ft
Dewater Time:	0.00 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,442.00	0.260	0.000	0.000		
5,442.50	0.285	0.136	0.000		
5,443.00	0.311	0.285	0.000		
5,443.50	0.338	0.448	0.000		
5,444.00	0.367	0.624	0.000		
5,444.50	0.396	0.815	0.000		
5,445.00	0.427	1.021	0.000		
5,445.50	0.459	1.242	0.000		
5,446.00	0.492	1.480	0.000		
5,446.50	0.526	1.734	0.000		
5,447.00	0.562	2.006	0.000		
5,447.50	0.598	2.296	0.000		
5,448.00	0.636	2.605	0.000		
5,448.50	0.675	2.932	0.000		
5,448.93	0.709	3.231	0.000	0.00	Peak Stage
5,449.00	0.714	3.280	0.000		
5,449.50	0.755	3.647	1.486		
5,450.00	0.798	4.035	4.189		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,450.50	0.841	4.445	7.695	
5,451.00	0.886	4.876	11.847	
5,451.50	0.931	5.331	16.175	
5,452.00	0.978	5.808	17.998	

Detailed Discharge Table

Elevation (ft)	Combined Total Discharge (cfs)
5,442.00	0.000
5,442.50	0.000
5,443.00	0.000
5,443.50	0.000
5,444.00	0.000
5,444.50	0.000
5,445.00	0.000
5,445.50	0.000
5,446.00	0.000
5,446.50	0.000
5,447.00	0.000
5,447.50	0.000
5,448.00	0.000
5,448.50	0.000
5,449.00	0.000
5,449.50	1.486
5,450.00	4.189
5,450.50	7.695
5,451.00	11.847
5,451.50	16.175
5,452.00	17.998

Structure #4 (Null)

TDS 5

Structure #5 (Pond)

CB 1-2

Pond Inputs:

Initial Pool Elev:	5,451.50 ft
Initial Pool:	0.41 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,451.81 ft
Dewater Time:	0.15 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,449.00	0.150	0.000	0.000		
5,449.50	0.156	0.076	0.000		
5,450.00	0.162	0.156	0.000		
5,450.50	0.168	0.238	0.000		
5,451.00	0.174	0.324	0.000		
5,451.50	0.180	0.412	0.000		Spillway #1
5,451.81	0.184	0.468	2.364	3.70	Peak Stage
5,452.00	0.187	0.504	3.871		
5,452.50	0.193	0.599	51.179		
5,453.00	0.200	0.698	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #2 (Erodible Channel)

MS 1-1 & DD1-1

Triangular Erodible Channel Inputs:

Material: Cobbles and shingles

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	1.9	0.0350	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	7.80 cfs	
Depth:	0.89 ft	1.89 ft
Top Width:	5.33 ft	11.33 ft
Velocity:	3.30 fps	
X-Section Area:	2.37 sq ft	
Hydraulic Radius:	0.421 ft	
Froude Number:	0.87	

Structure #3 (Pond)

CB 1-1

Pond Inputs:

Initial Pool Elev:	5,451.50 ft
Initial Pool:	0.46 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,452.04 ft
Dewater Time:	0.16 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,448.00	0.100	0.000	0.000	
5,448.50	0.108	0.052	0.000	
5,449.00	0.117	0.109	0.000	
5,449.50	0.126	0.169	0.000	
5,450.00	0.136	0.235	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,450.50	0.146	0.305	0.000		
5,451.00	0.156	0.381	0.000		
5,451.50	0.166	0.461	0.000		Spillway #1
5,452.00	0.177	0.547	3.871	3.75	
5,452.04	0.178	0.555	7.673	0.05	Peak Stage
5,452.50	0.188	0.639	51.179		
5,453.00	0.200	0.736	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #1 (Erodible Channel)

WS 1-1 & DD1-2

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.3	0.0350	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	33.09 cfs	
Depth:	0.71 ft	1.71 ft
Top Width:	14.83 ft	18.83 ft
Velocity:	3.48 fps	

	w/o Freeboard	w/ Freeboard
X-Section Area:	9.50 sq ft	
Hydraulic Radius:	0.626 ft	
Froude Number:	0.77	

Structure #14 (Riprap Channel)

RAMP DITCH 1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	38.84 cfs	
Depth:	0.36 ft	1.36 ft
Top Width:	13.43 ft	17.43 ft
Velocity*:		
X-Section Area:	4.55 sq ft	
Hydraulic Radius:	0.334 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#16	1	6.350	0.199	0.000	0.000	86.200	M	4.85	0.229
	Σ	**6.350**						**4.85**	**0.229**
#11	1	22.110	0.307	0.000	0.000	89.000	M	17.78	0.996
	Σ	**22.110**						**17.78**	**0.996**
#12	Σ	**28.460**						**22.15**	**1.225**
#4	1	4.740	0.080	0.000	0.000	81.500	M	4.92	0.143
	Σ	**4.740**						**4.92**	**0.143**
#5	Σ	**4.740**						**4.92**	**0.143**
#2	1	4.870	0.118	0.000	0.000	89.000	M	7.80	0.274
	Σ	**4.870**						**7.80**	**0.274**
#3	Σ	**4.870**						**7.80**	**0.274**
#1	1	42.850	0.194	0.000	0.000	86.200	M	33.09	1.551
	Σ	**42.850**						**33.09**	**1.551**
#14	Σ	**80.920**						**38.84**	**1.967**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.03	14.00	690.00	1.420	0.134
		8. Large gullies, diversions, and low flowing streams	2.11	20.00	950.00	4.350	0.060
#1	**1**	**Time of Concentration:**					**0.194**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		8. Large gullies, diversions, and low flowing streams	2.48	24.00	966.02	4.720	0.056
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#2	**1**	**Time of Concentration:**					**0.118**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		8. Large gullies, diversions, and low flowing streams	1.33	8.00	600.00	3.460	0.048
		7. Paved area and small upland gullies	33.00	44.88	136.00	11.560	0.003

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	**1**	**Time of Concentration:**					**0.080**
#11	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	15.00	750.00	1.410	0.147
		8. Large gullies, diversions, and low flowing streams	1.46	30.00	2,050.00	3.620	0.157
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#11	**1**	**Time of Concentration:**					**0.307**
#16	1	3. Short grass pasture	2.20	5.00	227.00	1.180	0.053
		6. Grassed waterway	2.40	20.00	833.05	2.320	0.099
		7. Paved area and small upland gullies	2.04	10.00	489.02	2.870	0.047
#16	**1**	**Time of Concentration:**					**0.199**

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Attachment 26.A-E.1.3
Pinabete Diversion
Drainage and Sediment Control Plan
Watershed 1 (WS1)

Ditch and berm/pond outlet designs

100-yr, 6- hour precipitation event 2.04 inches

CBEGEJ

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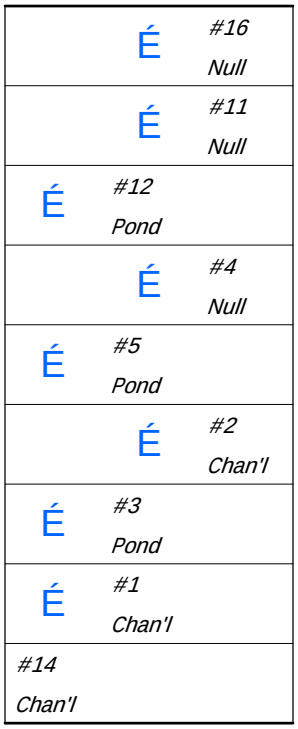
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	100 yr - 6 hr
Rainfall Depth:	2.040 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#14	0.026	0.412	WS 1-1 & DD1-2
Channel	#2	==>	#3	0.025	0.306	MS 1-1 & DD1-1
Pond	#3	==>	#14	0.026	0.412	CB 1-1
Null	#4	==>	#5	0.000	0.000	TDS 5
Pond	#5	==>	#14	0.026	0.412	CB 1-2
Null	#11	==>	#12	0.000	0.000	MS 1-2
Pond	#12	==>	#14	0.000	0.000	POND 1-1
Channel	#14	==>	End	0.000	0.000	RAMP DITCH 1
Null	#16	==>	#12	0.000	0.000	DD1-3



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#1	**Muskingum K:**					**0.026**
#2	8. Large gullies, diversions, and low flowing streams	0.80	2.00	250.00	2.68	0.025
#2	**Muskingum K:**					**0.025**

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#3	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#3	**Muskingum K:**					**0.026**
#5	8. Large gullies, diversions, and low flowing streams	7.00	52.50	750.00	7.93	0.026
#5	**Muskingum K:**					**0.026**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#16		6.350	6.350	7.76	0.38
#11		22.110	22.110	27.66	1.56
#12	In	0.000	28.460	34.57	1.94
	Out			1.72	0.67
#4		4.740	4.740	8.09	0.26
#5	In	0.000	4.740	8.09	0.26
	Out			6.19	0.26
#2		4.870	4.870	11.42	0.43
#3	In	0.000	4.870	11.42	0.43
	Out			11.23	0.43
#1		42.850	42.850	52.89	2.55
#14		0.000	80.920	64.45	3.91

Structure Detail:

Structure #16 (Null)

DD1-3

Structure #11 (Null)

MS 1-2

Structure #12 (Pond)

POND 1-1

Pond Inputs:

Initial Pool Elev:	5,447.00 ft
Initial Pool:	2.01 ac-ft

Pond Results:

Peak Elevation:	5,449.54 ft
Dewater Time:	0.77 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,442.00	0.260	0.000	0.000		
5,442.50	0.285	0.136	0.000		
5,443.00	0.311	0.285	0.000		
5,443.50	0.338	0.448	0.000		
5,444.00	0.367	0.624	0.000		
5,444.50	0.396	0.815	0.000		
5,445.00	0.427	1.021	0.000		
5,445.50	0.459	1.242	0.000		
5,446.00	0.492	1.480	0.000		
5,446.50	0.526	1.734	0.000		
5,447.00	0.562	2.006	0.000		
5,447.50	0.598	2.296	0.000		
5,448.00	0.636	2.605	0.000		
5,448.50	0.675	2.932	0.000		
5,449.00	0.714	3.280	0.000		
5,449.50	0.755	3.647	1.486	17.55	
5,449.54	0.760	3.681	1.724	0.95	Peak Stage
5,450.00	0.798	4.035	4.189		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,450.50	0.841	4.445	7.695	
5,451.00	0.886	4.876	11.847	
5,451.50	0.931	5.331	16.175	
5,452.00	0.978	5.808	17.998	

Detailed Discharge Table

Elevation (ft)	Combined Total Discharge (cfs)
5,442.00	0.000
5,442.50	0.000
5,443.00	0.000
5,443.50	0.000
5,444.00	0.000
5,444.50	0.000
5,445.00	0.000
5,445.50	0.000
5,446.00	0.000
5,446.50	0.000
5,447.00	0.000
5,447.50	0.000
5,448.00	0.000
5,448.50	0.000
5,449.00	0.000
5,449.50	1.486
5,450.00	4.189
5,450.50	7.695
5,451.00	11.847
5,451.50	16.175
5,452.00	17.998

Structure #4 (Null)

TDS 5

Structure #5 (Pond)

CB 1-2

Pond Inputs:

Initial Pool Elev:	5,451.50 ft
Initial Pool:	0.41 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,452.02 ft
Dewater Time:	0.16 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,449.00	0.150	0.000	0.000		
5,449.50	0.156	0.076	0.000		
5,450.00	0.162	0.156	0.000		
5,450.50	0.168	0.238	0.000		
5,451.00	0.174	0.324	0.000		
5,451.50	0.180	0.412	0.000		Spillway #1
5,452.00	0.187	0.504	3.871	3.85	
5,452.02	0.187	0.509	6.189	0.05	Peak Stage
5,452.50	0.193	0.599	51.179		
5,453.00	0.200	0.698	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #2 (Erodible Channel)

MS 1-1 & DD1-1

Triangular Erodible Channel Inputs:

Material: Cobbles and shingles

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	1.9	0.0350	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	11.42 cfs	
Depth:	1.02 ft	2.02 ft
Top Width:	6.15 ft	12.15 ft
Velocity:	3.63 fps	
X-Section Area:	3.15 sq ft	
Hydraulic Radius:	0.486 ft	
Froude Number:	0.89	

Structure #3 (Pond)

CB 1-1

Pond Inputs:

Initial Pool Elev:	5,451.50 ft
Initial Pool:	0.46 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,451.50	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,452.08 ft
Dewater Time:	0.16 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,448.00	0.100	0.000	0.000	
5,448.50	0.108	0.052	0.000	
5,449.00	0.117	0.109	0.000	
5,449.50	0.126	0.169	0.000	
5,450.00	0.136	0.235	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,450.50	0.146	0.305	0.000		
5,451.00	0.156	0.381	0.000		
5,451.50	0.166	0.461	0.000		Spillway #1
5,452.00	0.177	0.547	3.871	3.85	
5,452.08	0.179	0.561	11.227	0.05	Peak Stage
5,452.50	0.188	0.639	51.179		
5,453.00	0.200	0.736	105.737		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,448.00	0.000	0.000
5,448.50	0.000	0.000
5,449.00	0.000	0.000
5,449.50	0.000	0.000
5,450.00	0.000	0.000
5,450.50	0.000	0.000
5,451.00	0.000	0.000
5,451.50	0.000	0.000
5,452.00	3.871	3.871
5,452.50	51.179	51.179
5,453.00	105.737	105.737

Structure #1 (Erodible Channel)

WS 1-1 & DD1-2

Trapezoidal Erodible Channel Inputs:

Material: Cobbles and shingles

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.3	0.0350	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	52.89 cfs	
Depth:	0.93 ft	1.93 ft
Top Width:	15.72 ft	19.72 ft
Velocity:	4.10 fps	

	w/o Freeboard	w/ Freeboard
X-Section Area:	12.91 sq ft	
Hydraulic Radius:	0.799 ft	
Froude Number:	0.80	

Structure #14 (Riprap Channel)

RAMP DITCH 1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	64.45 cfs	
Depth:	0.53 ft	1.53 ft
Top Width:	14.12 ft	18.12 ft
Velocity*:		
X-Section Area:	6.92 sq ft	
Hydraulic Radius:	0.481 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#16	1	6.350	0.199	0.000	0.000	86.200	M	7.76	0.377
	Σ	**6.350**						**7.76**	**0.377**
#11	1	22.110	0.307	0.000	0.000	89.000	M	27.66	1.564
	Σ	**22.110**						**27.66**	**1.564**
#12	Σ	**28.460**						**34.57**	**1.941**
#4	1	4.740	0.080	0.000	0.000	81.500	M	8.09	0.257
	Σ	**4.740**						**8.09**	**0.257**
#5	Σ	**4.740**						**8.09**	**0.257**
#2	1	4.870	0.118	0.000	0.000	89.000	M	11.42	0.430
	Σ	**4.870**						**11.42**	**0.430**
#3	Σ	**4.870**						**11.42**	**0.430**
#1	1	42.850	0.194	0.000	0.000	86.200	M	52.89	2.552
	Σ	**42.850**						**52.89**	**2.552**
#14	Σ	**80.920**						**64.45**	**3.906**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.03	14.00	690.00	1.420	0.134
		8. Large gullies, diversions, and low flowing streams	2.11	20.00	950.00	4.350	0.060
#1	**1**	**Time of Concentration:**					**0.194**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		8. Large gullies, diversions, and low flowing streams	2.48	24.00	966.02	4.720	0.056
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#2	**1**	**Time of Concentration:**					**0.118**
#4	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		8. Large gullies, diversions, and low flowing streams	1.33	8.00	600.00	3.460	0.048
		7. Paved area and small upland gullies	33.00	44.88	136.00	11.560	0.003

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	**1**	**Time of Concentration:**					**0.080**
#11	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	15.00	750.00	1.410	0.147
		8. Large gullies, diversions, and low flowing streams	1.46	30.00	2,050.00	3.620	0.157
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#11	**1**	**Time of Concentration:**					**0.307**
#16	1	3. Short grass pasture	2.20	5.00	227.00	1.180	0.053
		6. Grassed waterway	2.40	20.00	833.05	2.320	0.099
		7. Paved area and small upland gullies	2.04	10.00	489.02	2.870	0.047
#16	**1**	**Time of Concentration:**					**0.199**

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Attachment 26.A-E.2.1
Pinabete Diversion
Drainage and Sediment Control Plan
Watershed 2 (WS2)

Ditch and berm/pond outlet designs

10-yr, 24-hour precipitation event 1.7 inches

CBEGEJ

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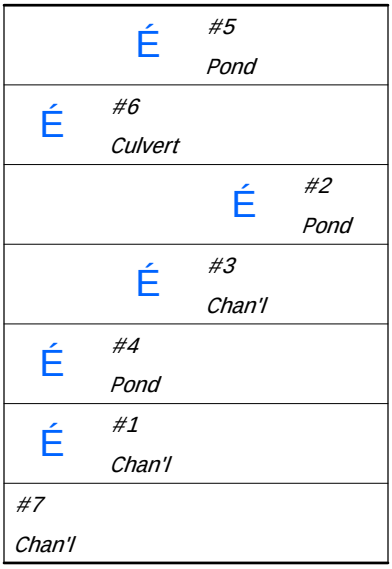
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.700 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#7	0.000	0.000	WS 2-1. Ditch DD2-1
Pond	#2	==>	#3	0.679	0.173	TDS 6 and CB 2-3
Channel	#3	==>	#4	0.000	0.000	MS 2-1 and ditch
Pond	#4	==>	#7	0.052	0.406	MS 2-1 and CB 2-1
Pond	#5	==>	#6	0.068	0.209	TDS 7 and CB 2-2
Culvert	#6	==>	#7	0.000	0.000	CP101
Channel	#7	==>	End	0.000	0.000	Ramp Ditch 2 Ramp Ditch -1



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	8. Large gullies, diversions, and low flowing streams	0.09	2.00	2,202.64	0.90	0.679
#2	**Muskingum K:**					**0.679**
#4	8. Large gullies, diversions, and low flowing streams	6.00	82.50	1,375.00	7.34	0.052
#4	**Muskingum K:**					**0.052**
#5	8. Large gullies, diversions, and low flowing streams	0.17	0.50	300.12	1.22	0.068
#5	**Muskingum K:**					**0.068**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#5	In	4.820	4.820	4.59	0.18
	Out			2.85	0.18
#6		0.200	5.020	2.67	0.19
#2	In	8.810	8.810	3.62	0.26
	Out			1.21	0.26
#3		37.570	46.380	18.41	2.22
#4	In	0.000	46.380	18.41	2.22
	Out			10.56	2.22
#1		29.270	29.270	17.32	0.98
#7		0.000	80.670	20.71	3.39

Structure Detail:

Structure #5 (Pond)

TDS 7 and CB 2-2

Pond Inputs:

Initial Pool Elev:	5,477.00 ft
Initial Pool:	0.91 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,477.00	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,477.11 ft
Dewater Time:	0.76 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,474.00	0.200	0.000	0.000		
5,474.20	0.213	0.041	0.000		
5,474.40	0.227	0.085	0.000		
5,474.60	0.241	0.132	0.000		
5,474.80	0.255	0.182	0.000		
5,475.00	0.270	0.234	0.000		
5,475.20	0.285	0.290	0.000		
5,475.40	0.301	0.348	0.000		
5,475.60	0.317	0.410	0.000		
5,475.80	0.333	0.475	0.000		
5,476.00	0.350	0.543	0.000		
5,476.20	0.357	0.614	0.000		
5,476.40	0.363	0.686	0.000		
5,476.60	0.370	0.759	0.000		
5,476.80	0.377	0.834	0.000		
5,477.00	0.384	0.910	0.000		Spillway #1
5,477.11	0.388	0.953	2.847	18.25	Peak Stage
5,477.20	0.391	0.988	5.190		
5,477.40	0.398	1.067	10.367		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,477.60	0.405	1.147	15.557	
5,477.80	0.413	1.229	26.313	
5,478.00	0.420	1.312	39.083	
5,478.20	0.437	1.398	54.567	
5,478.40	0.453	1.487	72.062	
5,478.60	0.471	1.579	91.515	
5,478.80	0.488	1.675	112.896	
5,479.00	0.506	1.774	136.186	
5,479.20	0.524	1.877	161.377	
5,479.40	0.543	1.984	188.466	
5,479.60	0.561	2.095	217.456	
5,479.80	0.581	2.209	248.353	
5,480.00	0.600	2.327	281.166	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,474.00	0.000	0.000
5,474.20	0.000	0.000
5,474.40	0.000	0.000
5,474.60	0.000	0.000
5,474.80	0.000	0.000
5,475.00	0.000	0.000
5,475.20	0.000	0.000
5,475.40	0.000	0.000
5,475.60	0.000	0.000
5,475.80	0.000	0.000
5,476.00	0.000	0.000
5,476.20	0.000	0.000
5,476.40	0.000	0.000
5,476.60	0.000	0.000
5,476.80	0.000	0.000
5,477.00	0.000	0.000
5,477.20	5.190	5.190
5,477.40	10.367	10.367
5,477.60	15.557	15.557
5,477.80	26.313	26.313
5,478.00	39.083	39.083
5,478.20	54.567	54.567

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,478.40	72.062	72.062
5,478.60	91.515	91.515
5,478.80	112.896	112.896
5,479.00	136.186	136.186
5,479.20	161.377	161.377
5,479.40	188.466	188.466
5,479.60	217.456	217.456
5,479.80	248.353	248.353
5,480.00	281.166	281.166

Structure #6 (Culvert)

CP101

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.00	0.0240	1.00	0.50	0.90

Culvert Results:

Design Discharge = 2.67 cfs

Minimum pipe diameter: 1 - 18 inch pipe(s) required

Structure #2 (Pond)

TDS 6 and CB 2-3

Pond Inputs:

Initial Pool Elev:	5,486.00 ft
Initial Pool:	0.88 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,486.00	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,486.21 ft
Dewater Time:	0.81 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,482.00	0.100	0.000	0.000		
5,482.10	0.104	0.010	0.000		
5,482.20	0.108	0.021	0.000		
5,482.30	0.113	0.032	0.000		
5,482.40	0.117	0.043	0.000		
5,482.50	0.122	0.055	0.000		
5,482.60	0.126	0.068	0.000		
5,482.70	0.131	0.081	0.000		
5,482.80	0.136	0.094	0.000		
5,482.90	0.141	0.108	0.000		
5,483.00	0.146	0.122	0.000		
5,483.10	0.151	0.137	0.000		
5,483.20	0.156	0.152	0.000		
5,483.30	0.161	0.168	0.000		
5,483.40	0.166	0.185	0.000		
5,483.50	0.172	0.201	0.000		
5,483.60	0.177	0.219	0.000		
5,483.70	0.183	0.237	0.000		
5,483.80	0.188	0.255	0.000		
5,483.90	0.194	0.275	0.000		
5,484.00	0.200	0.294	0.000		
5,484.10	0.208	0.315	0.000		
5,484.20	0.217	0.336	0.000		
5,484.30	0.226	0.358	0.000		
5,484.40	0.235	0.381	0.000		
5,484.50	0.244	0.405	0.000		
5,484.60	0.253	0.430	0.000		
5,484.70	0.262	0.456	0.000		
5,484.80	0.272	0.482	0.000		
5,484.90	0.282	0.510	0.000		
5,485.00	0.291	0.539	0.000		
5,485.10	0.302	0.568	0.000		
5,485.20	0.312	0.599	0.000		
5,485.30	0.322	0.631	0.000		
5,485.40	0.333	0.663	0.000		
5,485.50	0.344	0.697	0.000		
5,485.60	0.355	0.732	0.000		
5,485.70	0.366	0.768	0.000		
5,485.80	0.377	0.805	0.000		
5,485.90	0.388	0.843	0.000		
5,486.00	0.400	0.883	0.000		Spillway #1

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,486.10	0.409	0.923	0.583	18.20	
5,486.20	0.418	0.965	1.166	1.05	
5,486.21	0.419	0.968	1.211	0.30	Peak Stage
5,486.30	0.427	1.007	1.747		
5,486.40	0.437	1.050	2.330		
5,486.50	0.446	1.094	2.913		
5,486.60	0.456	1.139	15.557		
5,486.70	0.465	1.186	20.390		
5,486.80	0.475	1.232	26.313		
5,486.90	0.485	1.280	32.456		
5,487.00	0.495	1.329	39.083		
5,487.10	0.505	1.380	46.570		
5,487.20	0.515	1.431	54.567		
5,487.30	0.525	1.482	63.067		
5,487.40	0.536	1.536	72.062		
5,487.50	0.546	1.590	81.546		
5,487.60	0.557	1.645	91.515		
5,487.70	0.567	1.701	101.966		
5,487.80	0.578	1.758	112.896		
5,487.90	0.589	1.817	124.303		
5,488.00	0.600	1.876	136.186		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,482.00	0.000	0.000
5,482.10	0.000	0.000
5,482.20	0.000	0.000
5,482.30	0.000	0.000
5,482.40	0.000	0.000
5,482.50	0.000	0.000
5,482.60	0.000	0.000
5,482.70	0.000	0.000
5,482.80	0.000	0.000
5,482.90	0.000	0.000
5,483.00	0.000	0.000
5,483.10	0.000	0.000
5,483.20	0.000	0.000
5,483.30	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,483.40	0.000	0.000
5,483.50	0.000	0.000
5,483.60	0.000	0.000
5,483.70	0.000	0.000
5,483.80	0.000	0.000
5,483.90	0.000	0.000
5,484.00	0.000	0.000
5,484.10	0.000	0.000
5,484.20	0.000	0.000
5,484.30	0.000	0.000
5,484.40	0.000	0.000
5,484.50	0.000	0.000
5,484.60	0.000	0.000
5,484.70	0.000	0.000
5,484.80	0.000	0.000
5,484.90	0.000	0.000
5,485.00	0.000	0.000
5,485.10	0.000	0.000
5,485.20	0.000	0.000
5,485.30	0.000	0.000
5,485.40	0.000	0.000
5,485.50	0.000	0.000
5,485.60	0.000	0.000
5,485.70	0.000	0.000
5,485.80	0.000	0.000
5,485.90	0.000	0.000
5,486.00	0.000	0.000
5,486.10	0.583	0.583
5,486.20	1.166	1.166
5,486.30	1.747	1.747
5,486.40	2.330	2.330
5,486.50	2.913	2.913
5,486.60	15.557	15.557
5,486.70	20.390	20.390
5,486.80	26.313	26.313
5,486.90	32.456	32.456
5,487.00	39.083	39.083
5,487.10	46.570	46.570
5,487.20	54.567	54.567
5,487.30	63.067	63.067
5,487.40	72.062	72.062

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,487.50	81.546	81.546
5,487.60	91.515	91.515
5,487.70	101.966	101.966
5,487.80	112.896	112.896
5,487.90	124.303	124.303
5,488.00	136.186	136.186

Structure #3 (Erodible Channel)

MS 2-1 and ditch

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	0.9	0.0300	1.00			5.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.41 cfs	
Depth:	0.50 ft	1.50 ft
Top Width:	14.02 ft	18.02 ft
Velocity:	2.81 fps	
X-Section Area:	6.56 sq ft	
Hydraulic Radius:	0.460 ft	
Froude Number:	0.72	

Structure #4 (Pond)

MS 2-1 and CB 2-1

Pond Inputs:

Initial Pool Elev:	5,482.00 ft
Initial Pool:	4.08 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,482.00	15.00	2.00:1	2.00:1	25.00

Pond Results:

Peak Elevation:	5,482.55 ft
Dewater Time:	1.03 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,476.00	0.230	0.000	0.000		
5,476.25	0.249	0.060	0.000		
5,476.50	0.268	0.124	0.000		
5,476.75	0.288	0.194	0.000		
5,477.00	0.309	0.269	0.000		
5,477.25	0.331	0.349	0.000		
5,477.50	0.353	0.434	0.000		
5,477.75	0.376	0.525	0.000		
5,478.00	0.400	0.622	0.000		
5,478.25	0.452	0.729	0.000		
5,478.50	0.506	0.848	0.000		
5,478.75	0.564	0.982	0.000		
5,479.00	0.625	1.131	0.000		
5,479.25	0.689	1.295	0.000		
5,479.50	0.756	1.475	0.000		
5,479.75	0.827	1.673	0.000		
5,480.00	0.900	1.889	0.000		
5,480.25	0.946	2.120	0.000		
5,480.50	0.993	2.362	0.000		
5,480.75	1.041	2.616	0.000		
5,481.00	1.091	2.883	0.000		
5,481.25	1.141	3.162	0.000		
5,481.50	1.193	3.454	0.000		
5,481.75	1.246	3.758	0.000		
5,482.00	1.300	4.077	0.000		Spillway #1
5,482.25	1.303	4.402	2.414	21.60	
5,482.50	1.306	4.728	4.829	2.30	
5,482.55	1.307	4.794	10.556	0.80	Peak Stage
5,482.75	1.309	5.055	33.331		
5,483.00	1.312	5.383	63.277		
5,483.25	1.316	5.711	87.776		
5,483.50	1.319	6.041	129.940		
5,483.75	1.322	6.371	161.486		
5,484.00	1.325	6.702	213.757		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.00	0.000	0.000
5,476.25	0.000	0.000
5,476.50	0.000	0.000
5,476.75	0.000	0.000
5,477.00	0.000	0.000
5,477.25	0.000	0.000
5,477.50	0.000	0.000
5,477.75	0.000	0.000
5,478.00	0.000	0.000
5,478.25	0.000	0.000
5,478.50	0.000	0.000
5,478.75	0.000	0.000
5,479.00	0.000	0.000
5,479.25	0.000	0.000
5,479.50	0.000	0.000
5,479.75	0.000	0.000
5,480.00	0.000	0.000
5,480.25	0.000	0.000
5,480.50	0.000	0.000
5,480.75	0.000	0.000
5,481.00	0.000	0.000
5,481.25	0.000	0.000
5,481.50	0.000	0.000
5,481.75	0.000	0.000
5,482.00	0.000	0.000
5,482.25	2.414	2.414
5,482.50	4.829	4.829
5,482.75	33.331	33.331
5,483.00	63.277	63.277
5,483.25	87.776	87.776
5,483.50	129.940	129.940
5,483.75	161.486	161.486
5,484.00	213.757	213.757

Structure #1 (Erodible Channel)

WS 2-1. Ditch DD2-1

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.9	0.0300	1.00			5.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	17.32 cfs	
Depth:	0.39 ft	1.39 ft
Top Width:	13.56 ft	17.56 ft
Velocity:	3.47 fps	
X-Section Area:	4.99 sq ft	
Hydraulic Radius:	0.363 ft	
Froude Number:	1.01	

Structure #7 (Riprap Channel)

Ramp Ditch 2

Ramp Ditch -1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
6.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	20.71 cfs	
Depth:	0.32 ft	1.32 ft
Top Width:	7.28 ft	11.28 ft
Velocity*:		
X-Section Area:	2.13 sq ft	
Hydraulic Radius:	0.287 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#5	1	4.820	0.056	0.000	0.000	81.500	M	4.59	0.177
	Σ	**4.820**						**4.59**	**0.177**
#6	1	0.200	0.004	0.000	0.000	89.000	M	0.30	0.010
	Σ	**5.020**						**2.67**	**0.187**
#2	1	8.810	0.301	0.000	0.000	81.500	M	3.62	0.259
	Σ	**8.810**						**3.62**	**0.259**
#3	1	37.570	0.681	0.000	0.000	89.000	M	18.40	1.958
	Σ	**46.380**						**18.41**	**2.217**
#4	Σ	**46.380**						**18.41**	**2.217**
#1	1	29.270	0.146	0.000	0.000	82.900	M	17.32	0.981
	Σ	**29.270**						**17.32**	**0.981**
#7	Σ	**80.670**						**20.71**	**3.385**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.33	7.00	300.00	1.520	0.054
		8. Large gullies, diversions, and low flowing streams	3.70	37.00	1,000.00	5.770	0.048
		8. Large gullies, diversions, and low flowing streams	1.87	12.28	657.00	4.100	0.044
#1	**1**	**Time of Concentration:**					**0.146**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	0.15	1.50	1,000.00	1.160	0.239
#2	**1**	**Time of Concentration:**					**0.301**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	20.00	1,000.00	1.410	0.197
		8. Large gullies, diversions, and low flowing streams	0.18	4.00	2,201.43	1.270	0.481
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#3	**1**	**Time of Concentration:**					**0.681**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		8. Large gullies, diversions, and low flowing streams	1.75	6.12	350.00	3.960	0.024
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#5	**1**	**Time of Concentration:**					**0.056**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	25.00	20.00	80.00	5.000	0.004
#6	**1**	**Time of Concentration:**					**0.004**

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Attachment 26.A-E.2.2
Pinabete Diversion
Drainage and Sediment Control Plan
Watershed 2 (WS2)

Ditch and berm/pond outlet designs

25-yr, 6-hour precipitation event 1.56 inches

CBEGEJ

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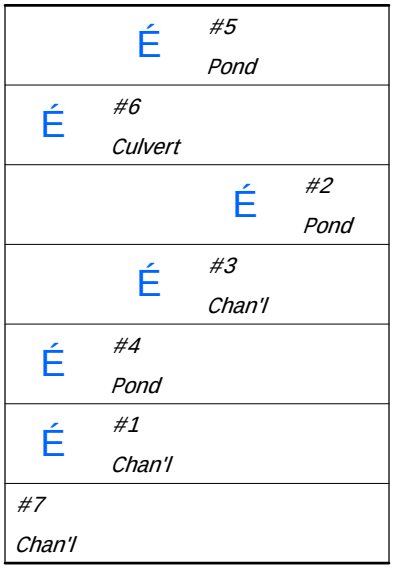
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	25 yr - 6 hr
Rainfall Depth:	1.560 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#7	0.000	0.000	WS 2-1. Ditch DD2-1
Pond	#2	==>	#3	0.679	0.173	TDS 6 and CB 2-3
Channel	#3	==>	#4	0.000	0.000	MS 2-1 and ditch
Pond	#4	==>	#7	0.052	0.406	MS 2-1 and CB 2-1
Pond	#5	==>	#6	0.068	0.209	TDS 7 and CB 2-2
Culvert	#6	==>	#7	0.000	0.000	CP101
Channel	#7	==>	End	0.000	0.000	Ramp Ditch 2 Ramp Ditch -1



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	8. Large gullies, diversions, and low flowing streams	0.09	2.00	2,202.64	0.90	0.679
#2	**Muskingum K:**					**0.679**
#4	8. Large gullies, diversions, and low flowing streams	6.00	82.50	1,375.00	7.34	0.052
#4	**Muskingum K:**					**0.052**
#5	8. Large gullies, diversions, and low flowing streams	0.17	0.50	300.12	1.22	0.068
#5	**Muskingum K:**					**0.068**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#5	In	4.820	4.820	5.00	0.15
	Out			3.04	0.15
#6		0.200	5.020	2.86	0.16
#2	In	8.810	8.810	3.87	0.21
	Out			1.28	0.21
#3		37.570	46.380	19.34	1.90
#4	In	0.000	46.380	19.34	1.90
	Out			11.59	1.90
#1		29.270	29.270	18.61	0.81
#7		0.000	80.670	22.17	2.87

Structure Detail:

Structure #5 (Pond)

TDS 7 and CB 2-2

Pond Inputs:

Initial Pool Elev:	5,477.00 ft
Initial Pool:	0.91 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,477.00	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,477.12 ft
Dewater Time:	0.14 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,474.00	0.200	0.000	0.000		
5,474.20	0.213	0.041	0.000		
5,474.40	0.227	0.085	0.000		
5,474.60	0.241	0.132	0.000		
5,474.80	0.255	0.182	0.000		
5,475.00	0.270	0.234	0.000		
5,475.20	0.285	0.290	0.000		
5,475.40	0.301	0.348	0.000		
5,475.60	0.317	0.410	0.000		
5,475.80	0.333	0.475	0.000		
5,476.00	0.350	0.543	0.000		
5,476.20	0.357	0.614	0.000		
5,476.40	0.363	0.686	0.000		
5,476.60	0.370	0.759	0.000		
5,476.80	0.377	0.834	0.000		
5,477.00	0.384	0.910	0.000		Spillway #1
5,477.12	0.388	0.956	3.043	3.45	Peak Stage
5,477.20	0.391	0.988	5.190		
5,477.40	0.398	1.067	10.367		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,477.60	0.405	1.147	15.557	
5,477.80	0.413	1.229	26.313	
5,478.00	0.420	1.312	39.083	
5,478.20	0.437	1.398	54.567	
5,478.40	0.453	1.487	72.062	
5,478.60	0.471	1.579	91.515	
5,478.80	0.488	1.675	112.896	
5,479.00	0.506	1.774	136.186	
5,479.20	0.524	1.877	161.377	
5,479.40	0.543	1.984	188.466	
5,479.60	0.561	2.095	217.456	
5,479.80	0.581	2.209	248.353	
5,480.00	0.600	2.327	281.166	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,474.00	0.000	0.000
5,474.20	0.000	0.000
5,474.40	0.000	0.000
5,474.60	0.000	0.000
5,474.80	0.000	0.000
5,475.00	0.000	0.000
5,475.20	0.000	0.000
5,475.40	0.000	0.000
5,475.60	0.000	0.000
5,475.80	0.000	0.000
5,476.00	0.000	0.000
5,476.20	0.000	0.000
5,476.40	0.000	0.000
5,476.60	0.000	0.000
5,476.80	0.000	0.000
5,477.00	0.000	0.000
5,477.20	5.190	5.190
5,477.40	10.367	10.367
5,477.60	15.557	15.557
5,477.80	26.313	26.313
5,478.00	39.083	39.083
5,478.20	54.567	54.567

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,478.40	72.062	72.062
5,478.60	91.515	91.515
5,478.80	112.896	112.896
5,479.00	136.186	136.186
5,479.20	161.377	161.377
5,479.40	188.466	188.466
5,479.60	217.456	217.456
5,479.80	248.353	248.353
5,480.00	281.166	281.166

Structure #6 (Culvert)

CP101

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.00	0.0240	1.00	0.50	0.90

Culvert Results:

Design Discharge = 2.86 cfs

Minimum pipe diameter: 1 - 18 inch pipe(s) required

Structure #2 (Pond)

TDS 6 and CB 2-3

Pond Inputs:

Initial Pool Elev:	5,486.00 ft
Initial Pool:	0.88 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,486.00	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,486.22 ft
Dewater Time:	0.25 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,482.00	0.100	0.000	0.000		
5,482.10	0.104	0.010	0.000		
5,482.20	0.108	0.021	0.000		
5,482.30	0.113	0.032	0.000		
5,482.40	0.117	0.043	0.000		
5,482.50	0.122	0.055	0.000		
5,482.60	0.126	0.068	0.000		
5,482.70	0.131	0.081	0.000		
5,482.80	0.136	0.094	0.000		
5,482.90	0.141	0.108	0.000		
5,483.00	0.146	0.122	0.000		
5,483.10	0.151	0.137	0.000		
5,483.20	0.156	0.152	0.000		
5,483.30	0.161	0.168	0.000		
5,483.40	0.166	0.185	0.000		
5,483.50	0.172	0.201	0.000		
5,483.60	0.177	0.219	0.000		
5,483.70	0.183	0.237	0.000		
5,483.80	0.188	0.255	0.000		
5,483.90	0.194	0.275	0.000		
5,484.00	0.200	0.294	0.000		
5,484.10	0.208	0.315	0.000		
5,484.20	0.217	0.336	0.000		
5,484.30	0.226	0.358	0.000		
5,484.40	0.235	0.381	0.000		
5,484.50	0.244	0.405	0.000		
5,484.60	0.253	0.430	0.000		
5,484.70	0.262	0.456	0.000		
5,484.80	0.272	0.482	0.000		
5,484.90	0.282	0.510	0.000		
5,485.00	0.291	0.539	0.000		
5,485.10	0.302	0.568	0.000		
5,485.20	0.312	0.599	0.000		
5,485.30	0.322	0.631	0.000		
5,485.40	0.333	0.663	0.000		
5,485.50	0.344	0.697	0.000		
5,485.60	0.355	0.732	0.000		
5,485.70	0.366	0.768	0.000		
5,485.80	0.377	0.805	0.000		
5,485.90	0.388	0.843	0.000		
5,486.00	0.400	0.883	0.000		Spillway #1

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,486.10	0.409	0.923	0.583	4.60	
5,486.20	0.418	0.965	1.166	1.00	
5,486.22	0.420	0.973	1.282	0.40	Peak Stage
5,486.30	0.427	1.007	1.747		
5,486.40	0.437	1.050	2.330		
5,486.50	0.446	1.094	2.913		
5,486.60	0.456	1.139	15.557		
5,486.70	0.465	1.186	20.390		
5,486.80	0.475	1.232	26.313		
5,486.90	0.485	1.280	32.456		
5,487.00	0.495	1.329	39.083		
5,487.10	0.505	1.380	46.570		
5,487.20	0.515	1.431	54.567		
5,487.30	0.525	1.482	63.067		
5,487.40	0.536	1.536	72.062		
5,487.50	0.546	1.590	81.546		
5,487.60	0.557	1.645	91.515		
5,487.70	0.567	1.701	101.966		
5,487.80	0.578	1.758	112.896		
5,487.90	0.589	1.817	124.303		
5,488.00	0.600	1.876	136.186		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,482.00	0.000	0.000
5,482.10	0.000	0.000
5,482.20	0.000	0.000
5,482.30	0.000	0.000
5,482.40	0.000	0.000
5,482.50	0.000	0.000
5,482.60	0.000	0.000
5,482.70	0.000	0.000
5,482.80	0.000	0.000
5,482.90	0.000	0.000
5,483.00	0.000	0.000
5,483.10	0.000	0.000
5,483.20	0.000	0.000
5,483.30	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,483.40	0.000	0.000
5,483.50	0.000	0.000
5,483.60	0.000	0.000
5,483.70	0.000	0.000
5,483.80	0.000	0.000
5,483.90	0.000	0.000
5,484.00	0.000	0.000
5,484.10	0.000	0.000
5,484.20	0.000	0.000
5,484.30	0.000	0.000
5,484.40	0.000	0.000
5,484.50	0.000	0.000
5,484.60	0.000	0.000
5,484.70	0.000	0.000
5,484.80	0.000	0.000
5,484.90	0.000	0.000
5,485.00	0.000	0.000
5,485.10	0.000	0.000
5,485.20	0.000	0.000
5,485.30	0.000	0.000
5,485.40	0.000	0.000
5,485.50	0.000	0.000
5,485.60	0.000	0.000
5,485.70	0.000	0.000
5,485.80	0.000	0.000
5,485.90	0.000	0.000
5,486.00	0.000	0.000
5,486.10	0.583	0.583
5,486.20	1.166	1.166
5,486.30	1.747	1.747
5,486.40	2.330	2.330
5,486.50	2.913	2.913
5,486.60	15.557	15.557
5,486.70	20.390	20.390
5,486.80	26.313	26.313
5,486.90	32.456	32.456
5,487.00	39.083	39.083
5,487.10	46.570	46.570
5,487.20	54.567	54.567
5,487.30	63.067	63.067
5,487.40	72.062	72.062

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,487.50	81.546	81.546
5,487.60	91.515	91.515
5,487.70	101.966	101.966
5,487.80	112.896	112.896
5,487.90	124.303	124.303
5,488.00	136.186	136.186

Structure #3 (Erodible Channel)

MS 2-1 and ditch

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	0.9	0.0300	1.00			5.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	19.34 cfs	
Depth:	0.52 ft	1.52 ft
Top Width:	14.08 ft	18.08 ft
Velocity:	2.86 fps	
X-Section Area:	6.77 sq ft	
Hydraulic Radius:	0.472 ft	
Froude Number:	0.73	

Structure #4 (Pond)

MS 2-1 and CB 2-1

Pond Inputs:

Initial Pool Elev:	5,482.00 ft
Initial Pool:	4.08 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,482.00	15.00	2.00:1	2.00:1	25.00

Pond Results:

Peak Elevation:	5,482.56 ft
Dewater Time:	0.56 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,476.00	0.230	0.000	0.000		
5,476.25	0.249	0.060	0.000		
5,476.50	0.268	0.124	0.000		
5,476.75	0.288	0.194	0.000		
5,477.00	0.309	0.269	0.000		
5,477.25	0.331	0.349	0.000		
5,477.50	0.353	0.434	0.000		
5,477.75	0.376	0.525	0.000		
5,478.00	0.400	0.622	0.000		
5,478.25	0.452	0.729	0.000		
5,478.50	0.506	0.848	0.000		
5,478.75	0.564	0.982	0.000		
5,479.00	0.625	1.131	0.000		
5,479.25	0.689	1.295	0.000		
5,479.50	0.756	1.475	0.000		
5,479.75	0.827	1.673	0.000		
5,480.00	0.900	1.889	0.000		
5,480.25	0.946	2.120	0.000		
5,480.50	0.993	2.362	0.000		
5,480.75	1.041	2.616	0.000		
5,481.00	1.091	2.883	0.000		
5,481.25	1.141	3.162	0.000		
5,481.50	1.193	3.454	0.000		
5,481.75	1.246	3.758	0.000		
5,482.00	1.300	4.077	0.000		Spillway #1
5,482.25	1.303	4.402	2.414	10.35	
5,482.50	1.306	4.728	4.829	2.20	
5,482.56	1.307	4.806	11.592	0.90	Peak Stage
5,482.75	1.309	5.055	33.331		
5,483.00	1.312	5.383	63.277		
5,483.25	1.316	5.711	87.776		
5,483.50	1.319	6.041	129.940		
5,483.75	1.322	6.371	161.486		
5,484.00	1.325	6.702	213.757		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,476.00	0.000	0.000
5,476.25	0.000	0.000
5,476.50	0.000	0.000
5,476.75	0.000	0.000
5,477.00	0.000	0.000
5,477.25	0.000	0.000
5,477.50	0.000	0.000
5,477.75	0.000	0.000
5,478.00	0.000	0.000
5,478.25	0.000	0.000
5,478.50	0.000	0.000
5,478.75	0.000	0.000
5,479.00	0.000	0.000
5,479.25	0.000	0.000
5,479.50	0.000	0.000
5,479.75	0.000	0.000
5,480.00	0.000	0.000
5,480.25	0.000	0.000
5,480.50	0.000	0.000
5,480.75	0.000	0.000
5,481.00	0.000	0.000
5,481.25	0.000	0.000
5,481.50	0.000	0.000
5,481.75	0.000	0.000
5,482.00	0.000	0.000
5,482.25	2.414	2.414
5,482.50	4.829	4.829
5,482.75	33.331	33.331
5,483.00	63.277	63.277
5,483.25	87.776	87.776
5,483.50	129.940	129.940
5,483.75	161.486	161.486
5,484.00	213.757	213.757

Structure #1 (Erodible Channel)

WS 2-1. Ditch DD2-1

Trapezoidal Erodible Channel Inputs:

Material: Graded loam to cobbles when noncolloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.9	0.0300	1.00			5.0

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.61 cfs	
Depth:	0.41 ft	1.41 ft
Top Width:	13.63 ft	17.63 ft
Velocity:	3.57 fps	
X-Section Area:	5.22 sq ft	
Hydraulic Radius:	0.378 ft	
Froude Number:	1.02	

Structure #7 (Riprap Channel)

Ramp Ditch 2

Ramp Ditch -1

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
6.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	22.17 cfs	
Depth:	0.34 ft	1.34 ft
Top Width:	7.35 ft	11.35 ft
Velocity*:		
X-Section Area:	2.26 sq ft	
Hydraulic Radius:	0.300 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#5	1	4.820	0.056	0.000	0.000	81.500	M	5.00	0.145
	Σ	**4.820**						**5.00**	**0.145**
#6	1	0.200	0.004	0.000	0.000	89.000	M	0.32	0.010
	Σ	**5.020**						**2.86**	**0.155**
#2	1	8.810	0.301	0.000	0.000	81.500	M	3.87	0.213
	Σ	**8.810**						**3.87**	**0.213**
#3	1	37.570	0.681	0.000	0.000	89.000	M	19.32	1.687
	Σ	**46.380**						**19.34**	**1.899**
#4	Σ	**46.380**						**19.34**	**1.899**
#1	1	29.270	0.146	0.000	0.000	82.900	M	18.61	0.813
	Σ	**29.270**						**18.61**	**0.813**
#7	Σ	**80.670**						**22.17**	**2.868**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.33	7.00	300.00	1.520	0.054
		8. Large gullies, diversions, and low flowing streams	3.70	37.00	1,000.00	5.770	0.048
		8. Large gullies, diversions, and low flowing streams	1.87	12.28	657.00	4.100	0.044
#1	**1**	**Time of Concentration:**					**0.146**
#2	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	0.15	1.50	1,000.00	1.160	0.239
#2	**1**	**Time of Concentration:**					**0.301**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	20.00	1,000.00	1.410	0.197
		8. Large gullies, diversions, and low flowing streams	0.18	4.00	2,201.43	1.270	0.481
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#3	**1**	**Time of Concentration:**					**0.681**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	3.00	150.00	1.410	0.029
		8. Large gullies, diversions, and low flowing streams	1.75	6.12	350.00	3.960	0.024
		7. Paved area and small upland gullies	33.00	44.55	134.99	11.560	0.003
#5	**1**	**Time of Concentration:**					**0.056**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	25.00	20.00	80.00	5.000	0.004
#6	**1**	**Time of Concentration:**					**0.004**

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Attachment 26.A-E.3.1
Pinabete Diversion
Drainage and Sediment Control Plan
Watershed 3 (WS3)

Ditch and berm/pond outlet designs

10-yr, 24 hour precipitation event 1.7inches

Michael Kendrick

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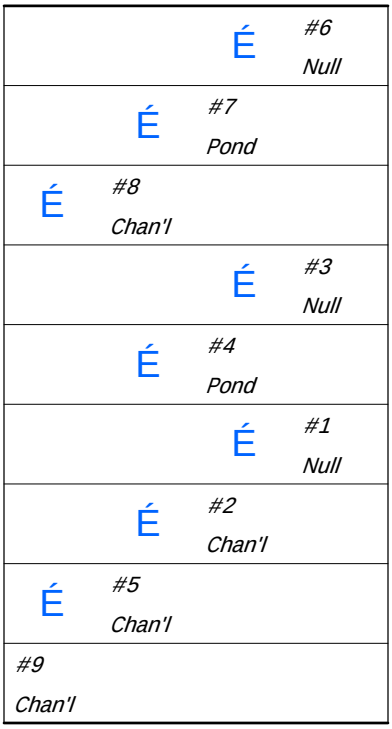
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.700 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	0.000	0.000	WS 3-1 WS3-1
Channel	#2	==>	#5	0.025	0.323	DD 3-1
Null	#3	==>	#4	0.000	0.000	MS 3-1
Pond	#4	==>	#5	0.025	0.323	CB 3-1
Channel	#5	==>	#9	0.026	0.412	DD 3-2
Null	#6	==>	#7	0.000	0.000	TDS 8
Pond	#7	==>	#8	0.043	0.318	CB 3-2
Channel	#8	==>	#9	0.026	0.412	DD 3-3
Channel	#9	==>	End	0.000	0.000	RAMP DITCH 3



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	8. Large gullies, diversions, and low flowing streams	1.06	3.00	282.00	3.09	0.025
#2	**Muskingum K:**					**0.025**
#4	8. Large gullies, diversions, and low flowing streams	1.06	3.00	282.00	3.09	0.025

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#4	**Muskingum K:**					**0.025**
#5	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#5	**Muskingum K:**					**0.026**
#7	8. Large gullies, diversions, and low flowing streams	0.98	4.50	460.02	2.96	0.043
#7	**Muskingum K:**					**0.043**
#8	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#8	**Muskingum K:**					**0.026**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#6		6.208	6.208	5.91	0.23
#7	In	0.000	6.208	5.91	0.23
	Out			4.66	0.23
#8		0.000	6.208	4.66	0.23
#3		12.149	12.149	9.76	0.64
#4	In	0.000	12.149	9.76	0.64
	Out			6.94	0.64
#1		66.380	66.380	30.82	2.19
#2		0.000	66.380	30.82	2.19
#5		0.000	78.529	37.58	2.82
#9		0.000	84.737	38.99	3.05

Structure Detail:

Structure #6 (Null)

TDS 8

Structure #7 (Pond)

CB 3-2

Pond Inputs:

Initial Pool Elev:	5,470.00 ft
Initial Pool:	0.52 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,470.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,470.14 ft
Dewater Time:	0.76 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,468.00	0.250	0.000	0.000		
5,468.20	0.252	0.050	0.000		
5,468.40	0.255	0.101	0.000		
5,468.60	0.257	0.152	0.000		
5,468.80	0.260	0.204	0.000		
5,469.00	0.262	0.256	0.000		
5,469.20	0.265	0.309	0.000		
5,469.40	0.267	0.362	0.000		
5,469.60	0.269	0.415	0.000		
5,469.80	0.272	0.470	0.000		
5,470.00	0.274	0.524	0.000		Spillway #1
5,470.14	0.276	0.562	4.661	18.15	Peak Stage
5,470.20	0.277	0.579	6.850		
5,470.40	0.279	0.635	13.682		
5,470.60	0.282	0.691	20.532		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,470.80	0.285	0.748	34.591	
5,471.00	0.287	0.805	51.179	
5,471.20	0.290	0.863	71.169	
5,471.40	0.292	0.921	93.619	
5,471.60	0.295	0.980	118.439	
5,471.80	0.297	1.039	145.565	
5,472.00	0.300	1.098	174.956	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,468.00	0.000	0.000
5,468.20	0.000	0.000
5,468.40	0.000	0.000
5,468.60	0.000	0.000
5,468.80	0.000	0.000
5,469.00	0.000	0.000
5,469.20	0.000	0.000
5,469.40	0.000	0.000
5,469.60	0.000	0.000
5,469.80	0.000	0.000
5,470.00	0.000	0.000
5,470.20	6.850	6.850
5,470.40	13.682	13.682
5,470.60	20.532	20.532
5,470.80	34.591	34.591
5,471.00	51.179	51.179
5,471.20	71.169	71.169
5,471.40	93.619	93.619
5,471.60	118.439	118.439
5,471.80	145.565	145.565
5,472.00	174.956	174.956

Structure #8 (Erodible Channel)

DD 3-3

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	4.66 cfs	
Depth:	0.68 ft	1.68 ft
Top Width:	4.11 ft	10.11 ft
Velocity:	3.32 fps	
X-Section Area:	1.41 sq ft	
Hydraulic Radius:	0.325 ft	
Froude Number:	1.00	

Structure #3 (Null)

MS 3-1

Structure #4 (Pond)

CB 3-1

Pond Inputs:

Initial Pool Elev:	5,466.60 ft
Initial Pool:	1.94 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,466.87 ft
Dewater Time:	0.79 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,462.00	0.350	0.000	0.000	
5,462.20	0.356	0.071	0.000	
5,462.40	0.362	0.142	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,462.60	0.368	0.215	0.000		
5,462.80	0.374	0.290	0.000		
5,463.00	0.380	0.365	0.000		
5,463.20	0.386	0.442	0.000		
5,463.40	0.393	0.520	0.000		
5,463.60	0.399	0.599	0.000		
5,463.80	0.405	0.679	0.000		
5,464.00	0.412	0.761	0.000		
5,464.20	0.418	0.844	0.000		
5,464.40	0.425	0.928	0.000		
5,464.60	0.431	1.014	0.000		
5,464.80	0.438	1.100	0.000		
5,465.00	0.444	1.189	0.000		
5,465.20	0.451	1.278	0.000		
5,465.40	0.458	1.369	0.000		
5,465.60	0.465	1.461	0.000		
5,465.80	0.471	1.555	0.000		
5,466.00	0.478	1.650	0.000		
5,466.20	0.485	1.746	0.000		
5,466.40	0.492	1.844	0.000		
5,466.60	0.499	1.943	0.000		Spillway #1
5,466.80	0.506	2.044	5.177	18.65	
5,466.87	0.509	2.078	6.942	0.20	Peak Stage
5,467.00	0.514	2.146	10.367		
5,467.20	0.521	2.249	15.557		
5,467.40	0.528	2.354	26.313		
5,467.60	0.535	2.461	39.083		
5,467.80	0.543	2.568	54.567		
5,468.00	0.550	2.678	72.062		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,462.00	0.000	0.000
5,462.20	0.000	0.000
5,462.40	0.000	0.000
5,462.60	0.000	0.000
5,462.80	0.000	0.000
5,463.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,463.20	0.000	0.000
5,463.40	0.000	0.000
5,463.60	0.000	0.000
5,463.80	0.000	0.000
5,464.00	0.000	0.000
5,464.20	0.000	0.000
5,464.40	0.000	0.000
5,464.60	0.000	0.000
5,464.80	0.000	0.000
5,465.00	0.000	0.000
5,465.20	0.000	0.000
5,465.40	0.000	0.000
5,465.60	0.000	0.000
5,465.80	0.000	0.000
5,466.00	0.000	0.000
5,466.20	0.000	0.000
5,466.40	0.000	0.000
5,466.60	0.000	0.000
5,466.80	5.177	5.177
5,467.00	10.367	10.367
5,467.20	15.557	15.557
5,467.40	26.313	26.313
5,467.60	39.083	39.083
5,467.80	54.567	54.567
5,468.00	72.062	72.062

Structure #1 (Null)

WS 3-1

WS3-1

Structure #2 (Erodible Channel)

DD 3-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	30.82 cfs	
Depth:	0.55 ft	1.55 ft
Top Width:	14.19 ft	18.19 ft
Velocity:	4.29 fps	
X-Section Area:	7.18 sq ft	
Hydraulic Radius:	0.497 ft	
Froude Number:	1.06	

Structure #5 (Erodible Channel)

DD 3-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	37.58 cfs	
Depth:	0.66 ft	1.66 ft
Top Width:	14.64 ft	18.64 ft
Velocity:	4.27 fps	
X-Section Area:	8.80 sq ft	
Hydraulic Radius:	0.588 ft	
Froude Number:	0.97	

Structure #9 (Riprap Channel)

RAMP DITCH 3

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	38.99 cfs	
Depth:	0.36 ft	1.36 ft
Top Width:	13.43 ft	17.43 ft
Velocity*:		
X-Section Area:	4.56 sq ft	
Hydraulic Radius:	0.335 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#6	1	6.208	0.103	0.000	0.000	81.500	M	5.91	0.228
	Σ	**6.208**						**5.91**	**0.228**
#7	Σ	**6.208**						**5.91**	**0.228**
#8	Σ	**6.208**						**4.66**	**0.228**
#3	1	12.149	0.261	0.000	0.000	89.000	M	9.76	0.636
	Σ	**12.149**						**9.76**	**0.636**
#4	Σ	**12.149**						**9.76**	**0.636**
#1	1	66.380	0.302	0.000	0.000	82.900	M	30.82	2.187
	Σ	**66.380**						**30.82**	**2.187**
#2	Σ	**66.380**						**30.82**	**2.187**
#5	Σ	**78.529**						**37.58**	**2.823**
#9	Σ	**84.737**						**38.99**	**3.052**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.50	2.00	80.00	1.580	0.014
		7. Paved area and small upland gullies	4.79	16.00	334.00	4.400	0.021
		7. Paved area and small upland gullies	1.82	28.00	1,542.02	2.710	0.158
		8. Large gullies, diversions, and low flowing streams	1.42	20.00	1,408.00	3.570	0.109
#1	**1**	**Time of Concentration:**					**0.302**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	4.79	240.00	1.410	0.047
		5. Nearly bare and untilled, and alluvial valley fans	33.00	45.00	136.36	5.740	0.006
		8. Large gullies, diversions, and low flowing streams	0.30	3.69	1,230.00	1.640	0.208
#3	**1**	**Time of Concentration:**					**0.261**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	33.00	10.00	30.30	5.740	0.001
		8. Large gullies, diversions, and low flowing streams	1.59	22.00	1,388.00	3.770	0.102
#6	**1**	**Time of Concentration:**					**0.103**

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Attachment 26.A-E.3.2
Pinabete Diversion
Drainage and Sediment Control Plan
Watershed 3 (WS3)

Ditch and berm/pond outlet designs

25-yr, 6- hour precipitation event 1.56 inches

Michael Kendrick

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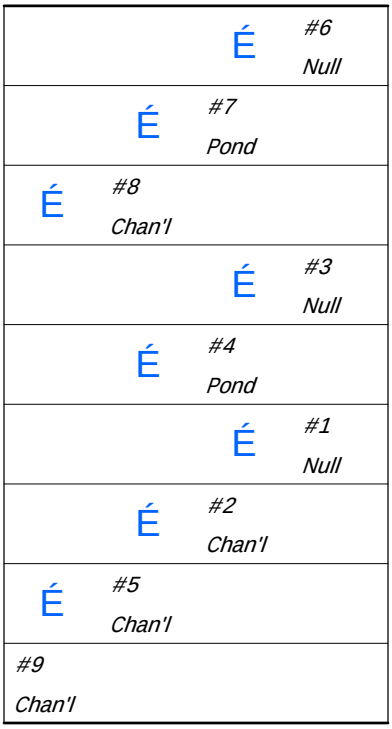
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	25 yr - 6 hr
Rainfall Depth:	1.560 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	0.000	0.000	WS 3-1 WS3-1
Channel	#2	==>	#5	0.025	0.323	DD 3-1
Null	#3	==>	#4	0.000	0.000	MS 3-1
Pond	#4	==>	#5	0.000	0.000	CB 3-1
Channel	#5	==>	#9	0.026	0.412	DD 3-2
Null	#6	==>	#7	0.000	0.000	TDS 8
Pond	#7	==>	#8	0.043	0.318	CB 3-2
Channel	#8	==>	#9	0.026	0.412	DD 3-3
Channel	#9	==>	End	0.000	0.000	RAMP DITCH 3



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	8. Large gullies, diversions, and low flowing streams	1.06	3.00	282.00	3.09	0.025
#2	**Muskingum K:**					**0.025**
#5	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#5	**Muskingum K:**					**0.026**
#7	8. Large gullies, diversions, and low flowing streams	0.98	4.50	460.02	2.96	0.043
#7	**Muskingum K:**					**0.043**
#8	8. Large gullies, diversions, and low flowing streams	7.00	53.20	760.00	7.93	0.026
#8	**Muskingum K:**					**0.026**

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Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#6		6.208	6.208	3.52	0.15
#7	In	0.000	6.208	3.52	0.15
	Out			2.92	0.15
#8		0.000	6.208	2.92	0.15
#3		12.149	12.149	9.18	0.55
#4	In	0.000	12.149	9.18	0.55
	Out			6.67	0.55
#1		66.380	66.380	32.98	1.81
#2		0.000	66.380	32.98	1.81
#5		0.000	78.529	38.91	2.36
#9		0.000	84.737	41.78	2.51

Structure Detail:

Structure #6 (Null)

TDS 8

Structure #7 (Pond)

CB 3-2

Pond Inputs:

Initial Pool Elev:	5,470.00 ft
Initial Pool:	0.52 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,470.00	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,470.09 ft
Dewater Time:	0.15 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,468.00	0.250	0.000	0.000		
5,468.20	0.252	0.050	0.000		
5,468.40	0.255	0.101	0.000		
5,468.60	0.257	0.152	0.000		
5,468.80	0.260	0.204	0.000		
5,469.00	0.262	0.256	0.000		
5,469.20	0.265	0.309	0.000		
5,469.40	0.267	0.362	0.000		
5,469.60	0.269	0.415	0.000		
5,469.80	0.272	0.470	0.000		
5,470.00	0.274	0.524	0.000		Spillway #1
5,470.09	0.276	0.548	2.920	3.55	Peak Stage
5,470.20	0.277	0.579	6.850		
5,470.40	0.279	0.635	13.682		
5,470.60	0.282	0.691	20.532		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,470.80	0.285	0.748	34.591	
5,471.00	0.287	0.805	51.179	
5,471.20	0.290	0.863	71.169	
5,471.40	0.292	0.921	93.619	
5,471.60	0.295	0.980	118.439	
5,471.80	0.297	1.039	145.565	
5,472.00	0.300	1.098	174.956	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,468.00	0.000	0.000
5,468.20	0.000	0.000
5,468.40	0.000	0.000
5,468.60	0.000	0.000
5,468.80	0.000	0.000
5,469.00	0.000	0.000
5,469.20	0.000	0.000
5,469.40	0.000	0.000
5,469.60	0.000	0.000
5,469.80	0.000	0.000
5,470.00	0.000	0.000
5,470.20	6.850	6.850
5,470.40	13.682	13.682
5,470.60	20.532	20.532
5,470.80	34.591	34.591
5,471.00	51.179	51.179
5,471.20	71.169	71.169
5,471.40	93.619	93.619
5,471.60	118.439	118.439
5,471.80	145.565	145.565
5,472.00	174.956	174.956

Structure #8 (Erodible Channel)

DD 3-3

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	2.0	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	2.92 cfs	
Depth:	0.57 ft	1.57 ft
Top Width:	3.45 ft	9.45 ft
Velocity:	2.95 fps	
X-Section Area:	0.99 sq ft	
Hydraulic Radius:	0.272 ft	
Froude Number:	0.97	

Structure #3 (Null)

MS 3-1

Structure #4 (Pond)

CB 3-1

Pond Inputs:

Initial Pool Elev:	5,466.60 ft
Initial Pool:	1.94 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	15.00

Pond Results:

Peak Elevation:	5,466.86 ft
Dewater Time:	0.18 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,462.00	0.350	0.000	0.000	
5,462.20	0.356	0.071	0.000	
5,462.40	0.362	0.142	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,462.60	0.368	0.215	0.000		
5,462.80	0.374	0.290	0.000		
5,463.00	0.380	0.365	0.000		
5,463.20	0.386	0.442	0.000		
5,463.40	0.393	0.520	0.000		
5,463.60	0.399	0.599	0.000		
5,463.80	0.405	0.679	0.000		
5,464.00	0.412	0.761	0.000		
5,464.20	0.418	0.844	0.000		
5,464.40	0.425	0.928	0.000		
5,464.60	0.431	1.014	0.000		
5,464.80	0.438	1.100	0.000		
5,465.00	0.444	1.189	0.000		
5,465.20	0.451	1.278	0.000		
5,465.40	0.458	1.369	0.000		
5,465.60	0.465	1.461	0.000		
5,465.80	0.471	1.555	0.000		
5,466.00	0.478	1.650	0.000		
5,466.20	0.485	1.746	0.000		
5,466.40	0.492	1.844	0.000		
5,466.60	0.499	1.943	0.000		Spillway #1
5,466.80	0.506	2.044	5.177	4.10	
5,466.86	0.508	2.073	6.671	0.20	Peak Stage
5,467.00	0.514	2.146	10.367		
5,467.20	0.521	2.249	15.557		
5,467.40	0.528	2.354	26.313		
5,467.60	0.535	2.461	39.083		
5,467.80	0.543	2.568	54.567		
5,468.00	0.550	2.678	72.062		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,462.00	0.000	0.000
5,462.20	0.000	0.000
5,462.40	0.000	0.000
5,462.60	0.000	0.000
5,462.80	0.000	0.000
5,463.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,463.20	0.000	0.000
5,463.40	0.000	0.000
5,463.60	0.000	0.000
5,463.80	0.000	0.000
5,464.00	0.000	0.000
5,464.20	0.000	0.000
5,464.40	0.000	0.000
5,464.60	0.000	0.000
5,464.80	0.000	0.000
5,465.00	0.000	0.000
5,465.20	0.000	0.000
5,465.40	0.000	0.000
5,465.60	0.000	0.000
5,465.80	0.000	0.000
5,466.00	0.000	0.000
5,466.20	0.000	0.000
5,466.40	0.000	0.000
5,466.60	0.000	0.000
5,466.80	5.177	5.177
5,467.00	10.367	10.367
5,467.20	15.557	15.557
5,467.40	26.313	26.313
5,467.60	39.083	39.083
5,467.80	54.567	54.567
5,468.00	72.062	72.062

Structure #1 (Null)

WS 3-1

WS3-1

Structure #2 (Erodible Channel)

DD 3-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.9	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	32.98 cfs	
Depth:	0.57 ft	1.57 ft
Top Width:	14.28 ft	18.28 ft
Velocity:	4.40 fps	
X-Section Area:	7.50 sq ft	
Hydraulic Radius:	0.515 ft	
Froude Number:	1.07	

Structure #5 (Erodible Channel)

DD 3-2

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	1.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	38.91 cfs	
Depth:	0.67 ft	1.67 ft
Top Width:	14.70 ft	18.70 ft
Velocity:	4.32 fps	
X-Section Area:	9.00 sq ft	
Hydraulic Radius:	0.599 ft	
Froude Number:	0.97	

Structure #9 (Riprap Channel)

RAMP DITCH 3

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	41.78 cfs	
Depth:	0.38 ft	1.38 ft
Top Width:	13.51 ft	17.51 ft
Velocity*:		
X-Section Area:	4.83 sq ft	
Hydraulic Radius:	0.353 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#6	1	6.208	0.137	0.000	0.000	81.500	M	3.52	0.152
	Σ	**6.208**						**3.52**	**0.152**
#7	Σ	**6.208**						**3.52**	**0.152**
#8	Σ	**6.208**						**2.92**	**0.152**
#3	1	12.149	0.354	0.000	0.000	89.000	M	9.18	0.548
	Σ	**12.149**						**9.18**	**0.548**
#4	Σ	**12.149**						**9.18**	**0.548**
#1	1	66.380	0.302	0.000	0.000	82.900	M	32.98	1.813
	Σ	**66.380**						**32.98**	**1.813**
#2	Σ	**66.380**						**32.98**	**1.813**
#5	Σ	**78.529**						**38.91**	**2.361**
#9	Σ	**84.737**						**41.78**	**2.513**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	2.50	2.00	80.00	1.580	0.014
		7. Paved area and small upland gullies	4.79	16.00	334.00	4.400	0.021
		7. Paved area and small upland gullies	1.82	28.00	1,542.02	2.710	0.158
		8. Large gullies, diversions, and low flowing streams	1.42	20.00	1,408.00	3.570	0.109
#1	**1**	**Time of Concentration:**					**0.302**
#3	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	13.28	664.00	1.410	0.130
		7. Paved area and small upland gullies	33.00	45.00	136.36	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	0.30	3.93	1,310.00	1.640	0.221
#3	**1**	**Time of Concentration:**					**0.354**
#6	1	5. Nearly bare and untilled, and alluvial valley fans	2.00	6.00	300.00	1.410	0.059
		8. Large gullies, diversions, and low flowing streams	1.50	15.00	1,000.00	3.670	0.075

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		7. Paved area and small upland gullies	33.00	44.55	135.00	11.560	0.003
#6	**1**	**Time of Concentration:**					**0.137**

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Attachment 26.A-E.4.1 Pinabete Diversion Drainage and Sediment Control Plan Watershed 4 (WS4)

Ditch and berm/pond outlet designs

10-yr, 24 hour precipitation event 1.7inches

Michael Kendrick

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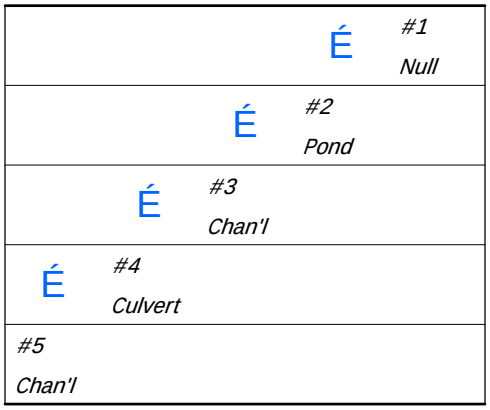
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.700 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	0.000	0.000	MS 4-1 WS3-1
Pond	#2	==>	#3	0.012	0.335	CB 4-1
Channel	#3	==>	#4	0.005	0.357	DD 4-1
Culvert	#4	==>	#5	0.000	0.000	CP 102
Channel	#5	==>	End	0.000	0.000	RAMP DITCH 4



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	8. Large gullies, diversions, and low flowing streams	1.33	2.00	150.00	3.46	0.012
#2	**Muskingum K:**					**0.012**
#3	8. Large gullies, diversions, and low flowing streams	2.00	1.59	79.50	4.24	0.005
#3	**Muskingum K:**					**0.005**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1		14.129	14.129	10.93	0.74
#2	In	0.000	14.129	10.93	0.74
	Out			8.59	0.74
#3		0.000	14.129	8.59	0.74
#4		0.000	14.129	8.59	0.74
#5		0.000	14.129	8.59	0.74

Structure Detail:

Structure #1 (Null)

MS 4-1

WS3-1

Structure #2 (Pond)

CB 4-1

Pond Inputs:

Initial Pool Elev:	5,466.60 ft
Initial Pool:	1.53 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,466.85 ft
Dewater Time:	0.78 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,462.00	0.200	0.000	0.000	
5,462.20	0.210	0.041	0.000	
5,462.40	0.220	0.084	0.000	
5,462.60	0.230	0.129	0.000	
5,462.80	0.241	0.176	0.000	
5,463.00	0.252	0.225	0.000	
5,463.20	0.263	0.277	0.000	
5,463.40	0.274	0.331	0.000	
5,463.60	0.286	0.387	0.000	
5,463.80	0.298	0.445	0.000	
5,464.00	0.310	0.506	0.000	
5,464.20	0.322	0.569	0.000	
5,464.40	0.334	0.634	0.000	
5,464.60	0.347	0.702	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,464.80	0.360	0.773	0.000		
5,465.00	0.373	0.846	0.000		
5,465.20	0.387	0.923	0.000		
5,465.40	0.400	1.001	0.000		
5,465.60	0.414	1.083	0.000		
5,465.80	0.428	1.167	0.000		
5,466.00	0.443	1.254	0.000		
5,466.20	0.458	1.344	0.000		
5,466.40	0.472	1.437	0.000		
5,466.60	0.488	1.533	0.000		Spillway #1
5,466.80	0.503	1.632	6.833	18.65	
5,466.85	0.507	1.658	8.587	0.15	Peak Stage
5,467.00	0.518	1.734	13.682		
5,467.20	0.534	1.840	20.532		
5,467.40	0.550	1.948	34.591		
5,467.60	0.567	2.060	51.179		
5,467.80	0.583	2.174	71.169		
5,468.00	0.600	2.293	93.619		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,462.00	0.000	0.000
5,462.20	0.000	0.000
5,462.40	0.000	0.000
5,462.60	0.000	0.000
5,462.80	0.000	0.000
5,463.00	0.000	0.000
5,463.20	0.000	0.000
5,463.40	0.000	0.000
5,463.60	0.000	0.000
5,463.80	0.000	0.000
5,464.00	0.000	0.000
5,464.20	0.000	0.000
5,464.40	0.000	0.000
5,464.60	0.000	0.000
5,464.80	0.000	0.000
5,465.00	0.000	0.000
5,465.20	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,465.40	0.000	0.000
5,465.60	0.000	0.000
5,465.80	0.000	0.000
5,466.00	0.000	0.000
5,466.20	0.000	0.000
5,466.40	0.000	0.000
5,466.60	0.000	0.000
5,466.80	6.833	6.833
5,467.00	13.682	13.682
5,467.20	20.532	20.532
5,467.40	34.591	34.591
5,467.60	51.179	51.179
5,467.80	71.169	71.169
5,468.00	93.619	93.619

Structure #3 (Erodible Channel)

DD 4-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	0.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	8.59 cfs	
Depth:	1.12 ft	2.12 ft
Top Width:	6.70 ft	12.70 ft
Velocity:	2.30 fps	
X-Section Area:	3.74 sq ft	
Hydraulic Radius:	0.529 ft	
Froude Number:	0.54	

Structure #4 (Culvert)

CP 102

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.50	0.0240	2.00	0.00	0.90

Culvert Results:

Design Discharge = 8.59 cfs

Minimum pipe diameter: 1 - 21 inch pipe(s) required

Structure #5 (Riprap Channel)

RAMP DITCH 4

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
6.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	8.59 cfs	
Depth:	0.17 ft	1.17 ft
Top Width:	6.67 ft	10.67 ft
Velocity*:		
X-Section Area:	1.07 sq ft	
Hydraulic Radius:	0.158 ft	
Froude Number*:		
Manning's n*:		
Dmin:	1.00 in	
D50:	3.00 in	
Dmax:	3.75 in	

Velocity and Manning's n calculations may not apply for this method.

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	14.129	0.291	0.000	0.000	89.000	M	10.93	0.738
	Σ	**14.129**						**10.93**	**0.738**
#2	Σ	**14.129**						**10.93**	**0.738**
#3	Σ	**14.129**						**8.59**	**0.738**
#4	Σ	**14.129**						**8.59**	**0.738**
#5	Σ	**14.129**						**8.59**	**0.738**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	7. Paved area and small upland gullies	33.00	45.00	136.36	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	0.50	7.50	1,500.00	2.120	0.196
		5. Nearly bare and untilled, and alluvial valley fans	2.00	9.39	469.50	1.410	0.092
#1	**1**	**Time of Concentration:**					**0.291**

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Attachment 26.A-E.4.2 Pinabete Diversion

Drainage and Sediment Control Plan

Watershed 4 (WS4)

Ditch and berm/pond outlet designs

25-yr, 6-hour precipitation event 1.56 inches

Michael Kendrick

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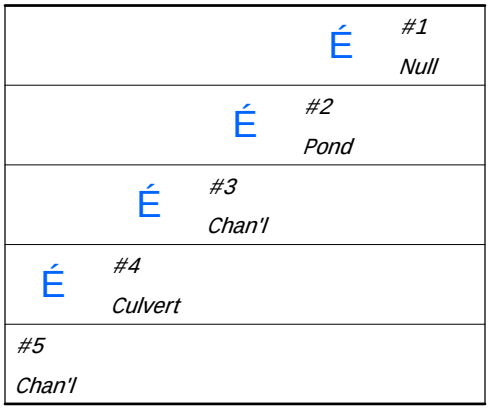
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	25 yr - 6 hr
Rainfall Depth:	1.560 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	#2	0.000	0.000	MS 4-1 WS3-1
Pond	#2	==>	#3	0.012	0.335	CB 4-1
Channel	#3	==>	#4	0.005	0.357	DD 4-1
Culvert	#4	==>	#5	0.000	0.000	CP 102
Channel	#5	==>	End	0.000	0.000	RAMP DITCH 4



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	8. Large gullies, diversions, and low flowing streams	1.33	2.00	150.00	3.46	0.012
#2	**Muskingum K:**					**0.012**
#3	8. Large gullies, diversions, and low flowing streams	2.00	1.59	79.50	4.24	0.005
#3	**Muskingum K:**					**0.005**

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Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1		14.129	14.129	11.61	0.64
#2	In	0.000	14.129	11.61	0.64
	Out			9.05	0.64
#3		0.000	14.129	9.05	0.64
#4		0.000	14.129	9.05	0.64
#5		0.000	14.129	9.05	0.64

Structure Detail:

Structure #1 (Null)

MS 4-1

WS3-1

Structure #2 (Pond)

CB 4-1

Pond Inputs:

Initial Pool Elev:	5,466.60 ft
Initial Pool:	1.53 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
5,466.60	15.00	2.00:1	2.00:1	20.00

Pond Results:

Peak Elevation:	5,466.86 ft
Dewater Time:	0.17 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
5,462.00	0.200	0.000	0.000	
5,462.20	0.210	0.041	0.000	
5,462.40	0.220	0.084	0.000	
5,462.60	0.230	0.129	0.000	
5,462.80	0.241	0.176	0.000	
5,463.00	0.252	0.225	0.000	
5,463.20	0.263	0.277	0.000	
5,463.40	0.274	0.331	0.000	
5,463.60	0.286	0.387	0.000	
5,463.80	0.298	0.445	0.000	
5,464.00	0.310	0.506	0.000	
5,464.20	0.322	0.569	0.000	
5,464.40	0.334	0.634	0.000	
5,464.60	0.347	0.702	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
5,464.80	0.360	0.773	0.000		
5,465.00	0.373	0.846	0.000		
5,465.20	0.387	0.923	0.000		
5,465.40	0.400	1.001	0.000		
5,465.60	0.414	1.083	0.000		
5,465.80	0.428	1.167	0.000		
5,466.00	0.443	1.254	0.000		
5,466.20	0.458	1.344	0.000		
5,466.40	0.472	1.437	0.000		
5,466.60	0.488	1.533	0.000		Spillway #1
5,466.80	0.503	1.632	6.833	3.95	
5,466.86	0.508	1.665	9.054	0.15	Peak Stage
5,467.00	0.518	1.734	13.682		
5,467.20	0.534	1.840	20.532		
5,467.40	0.550	1.948	34.591		
5,467.60	0.567	2.060	51.179		
5,467.80	0.583	2.174	71.169		
5,468.00	0.600	2.293	93.619		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,462.00	0.000	0.000
5,462.20	0.000	0.000
5,462.40	0.000	0.000
5,462.60	0.000	0.000
5,462.80	0.000	0.000
5,463.00	0.000	0.000
5,463.20	0.000	0.000
5,463.40	0.000	0.000
5,463.60	0.000	0.000
5,463.80	0.000	0.000
5,464.00	0.000	0.000
5,464.20	0.000	0.000
5,464.40	0.000	0.000
5,464.60	0.000	0.000
5,464.80	0.000	0.000
5,465.00	0.000	0.000
5,465.20	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
5,465.40	0.000	0.000
5,465.60	0.000	0.000
5,465.80	0.000	0.000
5,466.00	0.000	0.000
5,466.20	0.000	0.000
5,466.40	0.000	0.000
5,466.60	0.000	0.000
5,466.80	6.833	6.833
5,467.00	13.682	13.682
5,467.20	20.532	20.532
5,467.40	34.591	34.591
5,467.60	51.179	51.179
5,467.80	71.169	71.169
5,468.00	93.619	93.619

Structure #3 (Erodible Channel)

DD 4-1

Triangular Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
3.0:1	3.0:1	0.5	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	9.05 cfs	
Depth:	1.14 ft	2.14 ft
Top Width:	6.83 ft	12.83 ft
Velocity:	2.33 fps	
X-Section Area:	3.89 sq ft	
Hydraulic Radius:	0.540 ft	
Froude Number:	0.54	

Structure #4 (Culvert)

CP 102

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
80.00	1.50	0.0240	2.00	0.00	0.90

Culvert Results:

Design Discharge = 9.05 cfs

Minimum pipe diameter: 1 - 21 inch pipe(s) required

Structure #5 (Riprap Channel)

RAMP DITCH 4

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
6.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	9.05 cfs	
Depth:	0.17 ft	1.17 ft
Top Width:	6.70 ft	10.70 ft
Velocity*:		
X-Section Area:	1.11 sq ft	
Hydraulic Radius:	0.164 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	14.129	0.291	0.000	0.000	89.000	M	11.61	0.636
	Σ	**14.129**						**11.61**	**0.636**
#2	Σ	**14.129**						**11.61**	**0.636**
#3	Σ	**14.129**						**9.05**	**0.636**
#4	Σ	**14.129**						**9.05**	**0.636**
#5	Σ	**14.129**						**9.05**	**0.636**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	7. Paved area and small upland gullies	33.00	45.00	136.36	11.560	0.003
		8. Large gullies, diversions, and low flowing streams	0.50	7.50	1,500.00	2.120	0.196
		5. Nearly bare and untilled, and alluvial valley fans	2.00	9.39	469.50	1.410	0.092
#1	**1**	**Time of Concentration:**					**0.291**

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Attachment 26.A-E.5.1
Pinabete Diversion
Drainage and Sediment Control Plan
Watershed 5 (WS5)

Ditch and berm/pond outlet designs

10-yr, 24 hour precipitation event 1.70 inches

Michael Kendrick

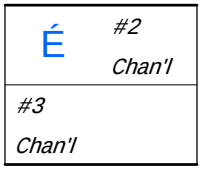
General Information

Storm Information:

Storm Type:	NRCS TYPE II-70
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.700 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#2	==>	#3	0.000	0.000	DD 5-1
Channel	#3	==>	End	0.000	0.000	RAMP DITCH 5



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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#2	282.150	282.150	65.84	9.27
#3	0.000	282.150	65.84	9.27

Structure Detail:

Structure #2 (Erodible Channel)

DD 5-1

Trapezoidal Erodible Channel Inputs:

Material: Graded silts to cobbles when colloidal

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
12.00	2.0:1	2.0:1	0.3	0.0300	1.00			5.5

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	65.84 cfs	
Depth:	1.54 ft	2.54 ft
Top Width:	18.14 ft	22.14 ft
Velocity:	2.85 fps	
X-Section Area:	23.14 sq ft	
Hydraulic Radius:	1.226 ft	
Froude Number:	0.44	

Structure #3 (Riprap Channel)

RAMP DITCH 5

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	2.0:1	2.0:1	7.0	1.00		

Riprap Channel Results:

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	65.84 cfs	
Depth:	0.74 ft	1.74 ft
Top Width:	14.96 ft	18.96 ft
Velocity:	6.59 fps	
X-Section Area:	9.99 sq ft	

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	w/o Freeboard	w/ Freeboard
Hydraulic Radius:	0.652 ft	
Froude Number:	1.42	
Manning's n:	0.0450	
Dmin:	3.00 in	
D50:	6.00 in	
Dmax:	9.00 in	

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	282.150	0.909	0.000	0.000	82.900	M	65.84	9.266
	Σ	**282.150**						**65.84**	**9.266**
#3	Σ	**282.150**						**65.84**	**9.266**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	1	5. Nearly bare and untilled, and alluvial valley fans	2.56	42.00	1,642.03	1.590	0.286
		5. Nearly bare and untilled, and alluvial valley fans	1.42	18.00	1,267.07	1.190	0.295
		8. Large gullies, diversions, and low flowing streams	0.94	18.00	1,915.09	2.900	0.183
		8. Large gullies, diversions, and low flowing streams	0.25	1.96	784.00	1.500	0.145
#2	**1**	**Time of Concentration:**					**0.909**

Appendix 26.B

Pond Embankment Slope Stability Evaluation

GEOMAT INC
2060 Afton Place ◆ Farmington, NM 87401 ◆ Tel (505) 327-7928 ◆ Fax (505) 326-5721

December 17, 2008

Leonard Raymond, P.E.
BHP Billiton
BHP Navajo Coal Company
P.O. Box 1717
Fruitland, New Mexico 87416

RE: Slope Stability Evaluation
Navajo Mine Area 4 South Pond 4 Embankment
GEOMAT Project No. 82-0728

As you requested, GEOMAT Inc. has completed geotechnical engineering analyses to evaluate the stability of the proposed roadway embankment which will form the dam of the Navajo Mine Area 4 Pond 4 at the referenced project site. As shown on the Plan and Profile sheet (provided by BHP Billiton) in Appendix A, the pond embankment will extend for approximately 450 feet between Station 358+00 and 362+50 of the proposed Area 4 South Road. We understand the embankment will be constructed of compacted on-site materials.

We selected the embankment at Station 361+50 to analyze for both the pond-side and non-pond sides of the roadway embankment. This section was selected to analyze, since it appeared to be the most critical condition in terms of slope height and location of the water in the adjacent pond. The configuration of the embankment and properties of the native soils and the soils that were used to construct the embankments and which were used in the analysis are as follows:

- Slopes (both sides of the embankment – main slopes): 2:1 Horizontal:Vertical (H:V)
- Slopes of safety berms: 1.5:1 H:V
- Top of embankment 5475'
- Base of embankment pond and non-pond sides El. 5442
- Height of embankment 33 ft
- Maximum water elevation in the embankment: 5463 ft
- Embankment material to be used: compacted on-site clay soil: compacted density 131 pcf; cohesion 250 psf; angle of internal friction (phi) 35 degrees
- Material type and strength data for the soil to be used in the embankment are based on information contained in the report for the project by Converse Consultants, Converse Project 07-53190-01, dated July 10, 2008

The location and configuration of the embankment and pond are depicted on the Plan and Profile sheet in Appendix A. Appendix A also contains a sheet (provided by BHP Billiton) showing the embankment cross-sections.

We understand the Area 4 South Pond 4 will be used to temporarily retain storm runoff water. We understand the embankment will retain 5.80 acre-feet for the 100 year - six hour event. The maximum capacity of the reservoir is 6.84 acre-feet. The water impounded behind the pond

embankment will be pumped out gradually, thus the maximum water level will be of short duration.

The Galena Slope Stability Analysis System computer program, version 4.02 was used to analyze the stability of both sides (the pond-side and non-pond-side) of the embankment. It should be noted that due to requirements of the program, all the slopes are plotted ascending to the right. The pond-side was analyzed with and without water. The analyses on the pond-side were analyzed using a pseudo-static earthquake force of 0.1g, since this would be the most critical condition. The non-pond side embankment was analyzed with and without the pseudo-static condition for comparison purposes. The analyses were performed using the soil strength/density parameters that were presented in the referenced Converse report. The soil profile at the site was obtained from boring D-24, the nearest boring to this site in the Converse report. Based on that information, we understand the material underlying and supporting the embankment is a silty lean clay from the ground surface to an approximate depth of 10 feet. From the ground surface to an approximate depth of 2 feet, the soil is soft. In our analysis, we assumed this soil would be removed to the two-foot depth. The clay is stiff to very stiff from about two to ten feet. This clay is underlain by sandstone and/or shale. Based on information in the Converse report, we estimated the following properties for the native silty clay: cohesion of 300 psf, angle of internal friction (phi) of 20 degrees and unit weight of 120 pcf. We estimated properties for the sandstone/shale of 2,500 psf cohesion, an angle of internal friction (phi) of 2 degrees and a unit weight of 128 pcf. The following properties were used for the compacted native material to be used in the embankment: cohesion of 250 psf, angle of internal friction (phi) of 35 degrees and unit weight of 131 pcf. All these values are intended to be conservative for these material types, since we do not have definitive test results for the soil conditions at this location.

For the pond-side of the embankment, analyses were performed for the condition of the pond being dry and with the water in the pond at the highest level. Rapid drawdown conditions were not analyzed, since a phreatic surface should not develop during the short time the water is impounded.

The results of the analyses are shown in the following table. Individual sheets showing the details of the calculations and the configuration of the slope used in the calculations are included in Appendix B.

Station	Side	Water Condition	Pseudo Static Earthquake (%g)	Calculated Factor of Safety
361+50	Pond	Reservoir empty	0.1	1.7
361+50	Pond	Reservoir full	0.1	1.7
361+50	Non-pond	N/A	0.0	2.3
361+50	Non-pond	N/A	0.1	1.8

As shown in the above table, the calculated factors of safety range from 1.7 to 2.3 for the embankment slope. A factor of safety of 1.3 is typically considered adequate by the Office of Surface Mining (OSM) for long term conditions for this type of embankment. Therefore, these conditions are considered to meet the OSM requirements.

The analysis and recommendations submitted in this report are based upon soil density and strength data obtained primarily from information in the Converse report. Information from GEOMAT's prior services in the area (GEOMAT Report No. 72-0466, dated May 18, 2007 and GEOMAT Report No. 72-0466, dated August 10, 2007) was also considered in estimating the soil density and strength parameters. Strength and density values for the shale bedrock were assumed from typical, relatively low values for that type of rock.

The nature and variation of the native materials and the materials to be used to construct the embankment may not become evident until construction or until the final source location and type of material to be used in the embankment is determined. If variations then appear, it will be necessary to reevaluate the recommendations of this report. Likewise, in the event that any changes in the nature, design, configuration or location of the embankment slopes are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed and the recommendations of this report modified or verified in writing by GEOMAT.

Thank you for the opportunity to work with you on this project. If you have any questions or need additional information, please let us know.

Sincerely yours,
GEOMAT Inc.

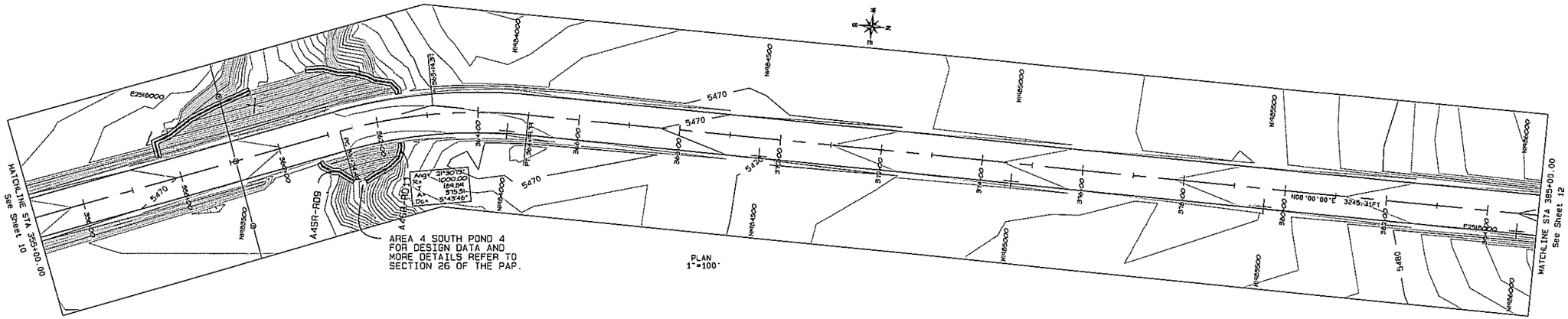
GEORGE A. MADRID
NEW MEXICO
9110
REGISTERED PROFESSIONAL ENGINEER

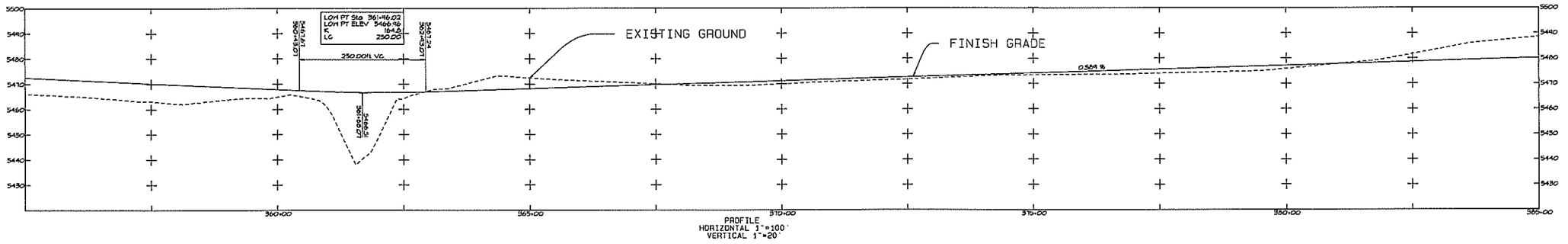
12-17-08

George A. Madrid, P.E.
President, Principal Engineer

Distribution: Addressee (3)

Appendix A



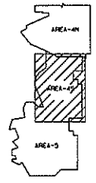


LEGEND

- ROAD
- WATERSHED
- BUILDING
- FENCE
- IRRIGATION LINE
- CULVERT
- DAM
- DRAINAGE
- RAILROAD
- TREES
- POWERLINE
- x5338.5 SPOT ELEVATION
- 5300 INDEX CONTOUR
- 5298 INTERMEDIATE CONTOUR
- 218 / 5422.45 CONTROL
- L-30 LEASE CORNER
- PERMIT/LEASE BOUNDARY

NOTES

1. For location of roads, drainage structures and waterbanks refer to Exhibit 23.2-1
2. The location of the support facilities are presented on Exhibit 22.1-1



SCALE AS NOTED

CERTIFICATION STATEMENT

I, Leonard Raymond, hereby certify that this drawing was reviewed by me and that the information shown is complete and accurate to the best of my knowledge.

LEONARD RAYMOND NEW MEXICO 6666 REGISTERED PROFESSIONAL ENGINEER

NO.	REVISION	DATE
	SUBMITTED TO OSM FOR APPROVAL	JANUARY 2022

PROJECT MANAGER: CH
CHKD. BY RECORD: LR
REG. NO. 6666
DRWN BY RECORD:
REG. NO.

BHP
bhpbilliton

BHP NAVAJO COAL COMPANY
NAVAJO MINE EXTENSION PROJECT

PO BOX 1717, FRUITLAND, NEW MEXICO, 87416 PHONE 505-598-4200/FAX 505-598-4228

PROJECT MAP:
DATE: JANUARY 2005
DESIGN BY: LR
DRAWN BY: RY
CHECKED BY: LR
APPROVED BY: LR

PLAN AND PROFILES

EXHIBIT 23.2-2
Area 4 South Road
Design

DRAWING

SHEET 11
OF 13

5480
5470
5460
5450
5440
5430
5420

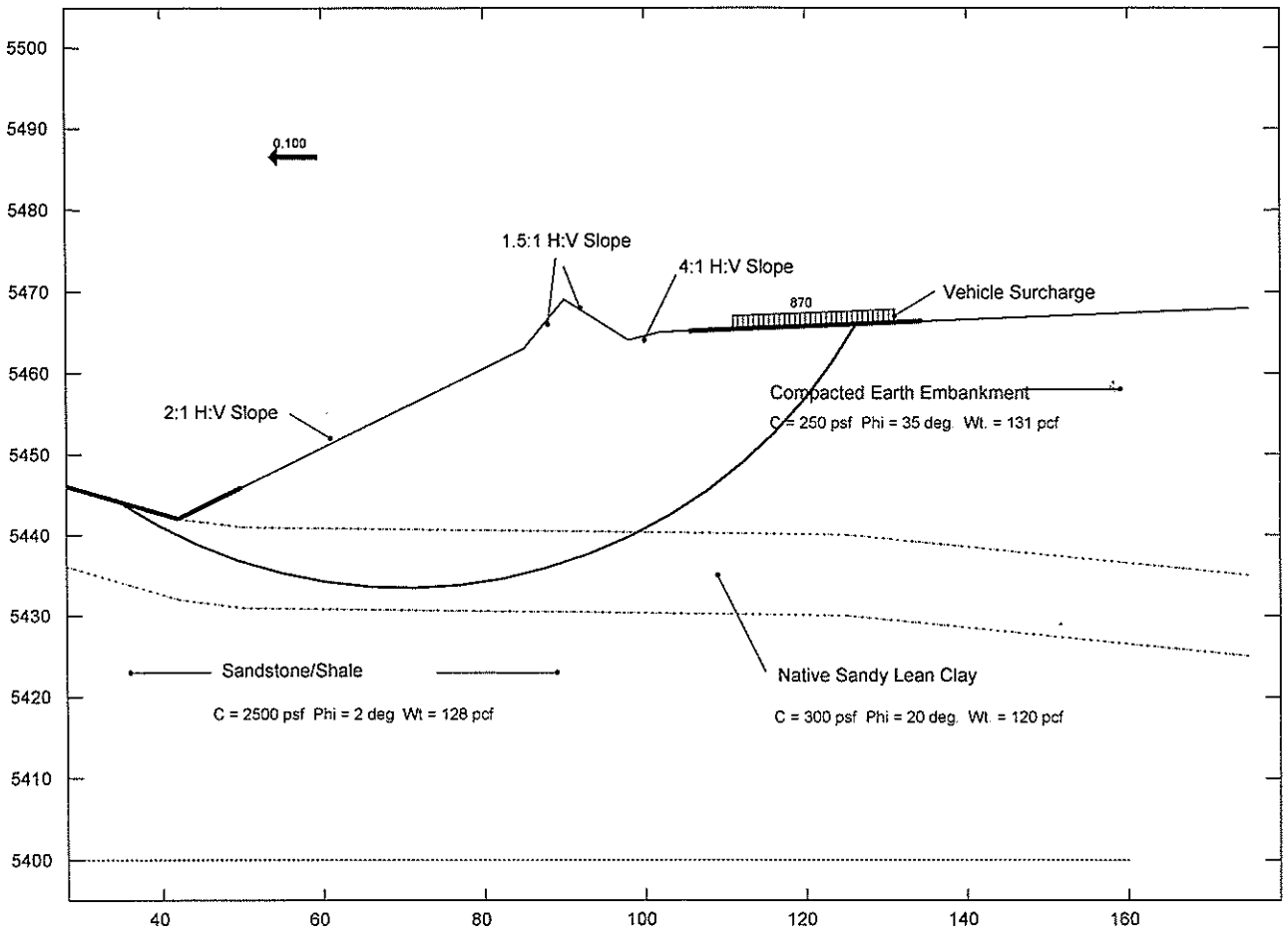
275
250
225
200
175
150
125
100
75
50
25
0
25
50
75
100
125
150
175
200
225

361+25.00

361+50.00

361+75.00

Appendix B



GALENA Version 4.02

Analysis: 1

Multiple Stability Analysis

Method: Spencer-Wright

Surface: Circular

Results

Critical (minimum) Factor of Safety: 1.68

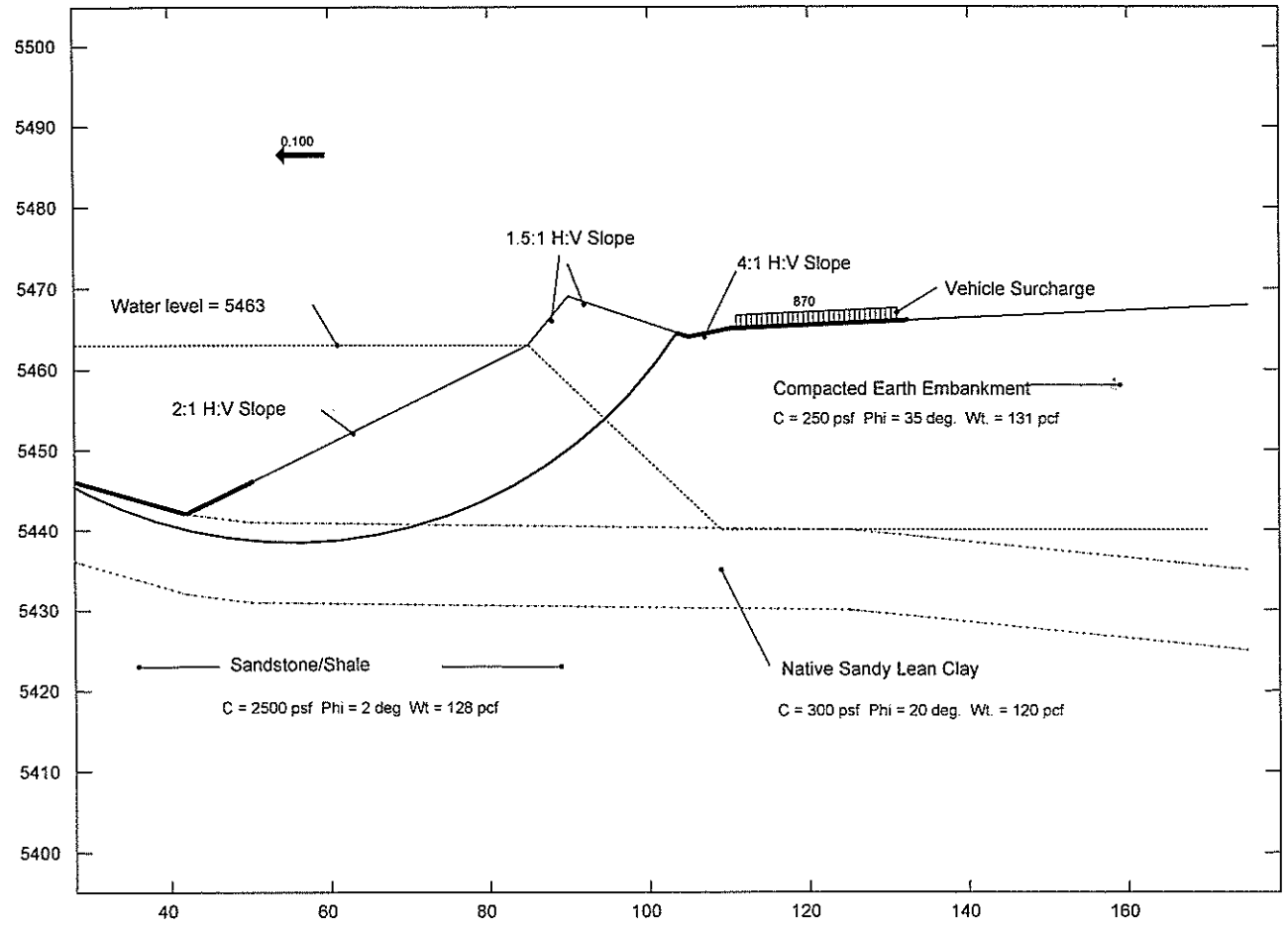
Final Angle of Interslice Forces: 11.6°

Project: 82-0728 BHP Haul Road Slope Stability Analysis - Sta 361+50 Pond Side with pond empty; earthquake = 0.1

82-0728 BHP Roadway Stability - Sta 361+50 Pond Empty; earthquake = 0.1

File: C:\Program Files\Galena\82-0728 BHP Roadway analysis - 361+50 Pond Side with water 12-08-08..gmf

GEOMAT Inc.



GALENA Version 4.02

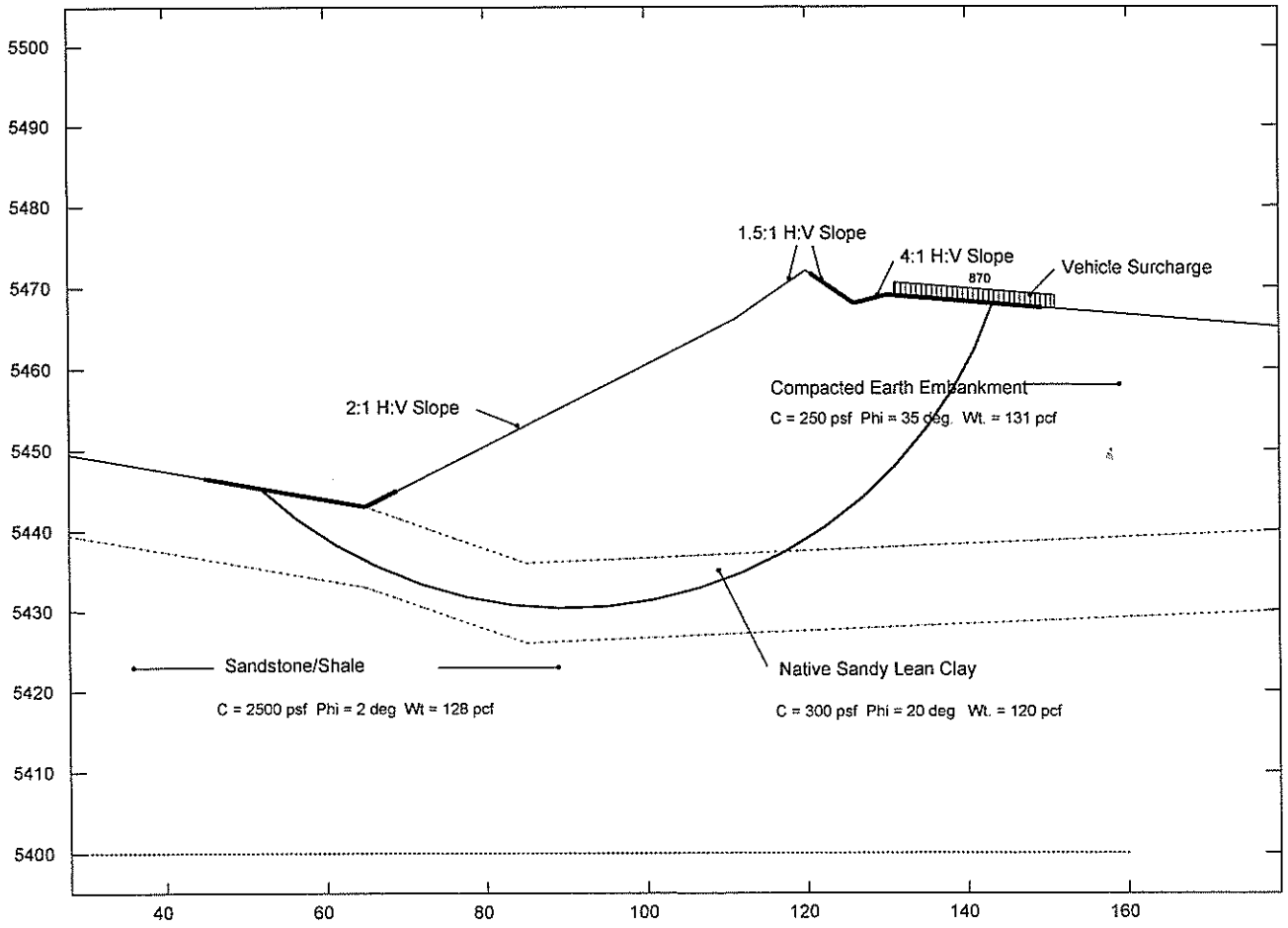
Analysis: 1
Multiple Stability Analysis
Method: Bishop Simplified
Surface: Circular

Results
Critical (minimum)
Factor of Safety: 1.69

Project: 82-0728 BHP Haul Road Slope Stability Analysis - Sta 361+50 Pond Side with pond full and earthquake = 0.1
82-0728 BHP Roadway Stability - Sta 361+50 Pond Side pod full; earthquake = 0.1

File: C:\Program Files\Galena\82-0728 BHP Roadway analysis - 361+50 Pond Side with water 12-08-08..gmf

GEOMAT Inc.



GALENA Version 4.02

Analysis: 1

Multiple Stability Analysis

Method: Bishop Simplified

Surface: Circular

Results

Critical (minimum)

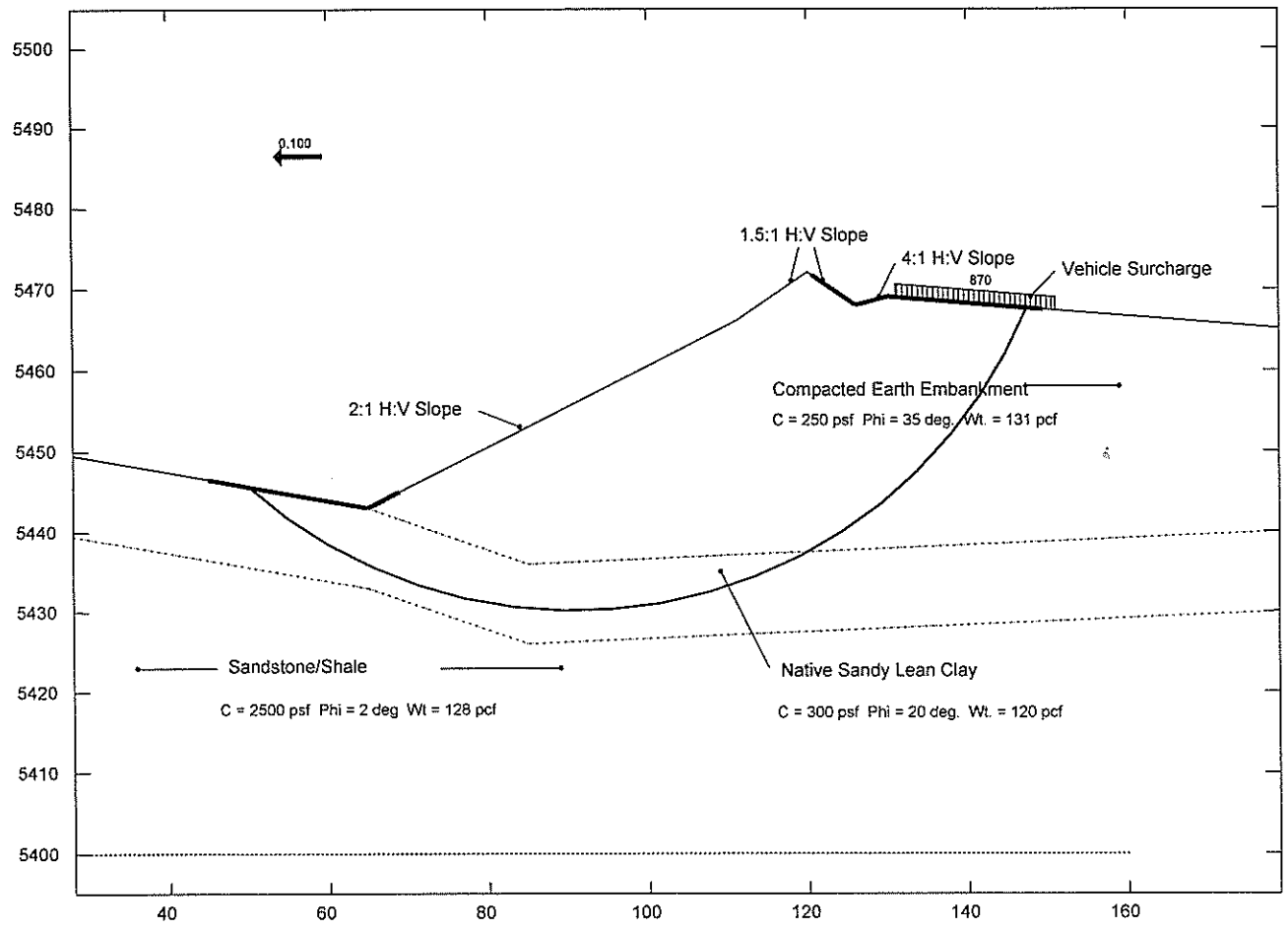
Factor of Safety: 2.26

Project: 82-0728 BHP Haul Road Slope Stability Analysis - Sta 361+50 Non-Pond Side; earthquake = 0.0

82-0728 BHP Roadway Stability - Sta 361+50 Non-Pond Side; earthquake = 0.0

File: C:\Program Files\Galena\82-0728 BHP Roadway analysis - 361+50 Pond Side with water 12-08-08..gmf

GEOMAT Inc.



GALENA Version 4.02

Analysis: 1
Multiple Stability Analysis
Method: Bishop Simplified
Surface: Circular

Results
Critical (minimum)
Factor of Safety: 1.78

Project: 82-0728 BHP Haul Road Slope Stability Analysis - Sta 361+50 Non-Pond Side; earthquake = 0.1
82-0728 BHP Roadway Stability - Sta 361+50 Non-Pond Side; earthquake = 0.1

File: C:\Program Files\Galena\82-0728 BHP Roadway analysis - Non-Pond Side 12-16-08..gmf

GEOMAT Inc.

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Pond 501
10 YR 6HR

Inlet channels are designed fora 10 yr-6hr storm event.

Pond capacity is designed for a 100 yr 6 hr storm event.

RY

NTEC
POBox 3767
Fruitland, NM 87499

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Pond 501
100 YR 6HR

Inlet channels are designed fora 10 yr-6hr storm event.

Pond capacity is designed for a 100 yr 6 hr storm event.

RY

NTEC
POBox 3767
Fruitland, NM 87499

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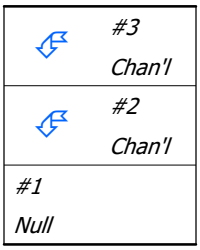
General Information

Storm Information:

Storm Type:	NM TYPE II 70
Design Storm:	100 yr - 6 hr
Rainfall Depth:	1.990 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	POND 501
Channel	#2	==>	#1	0.000	0.000	NW INLET
Channel	#3	==>	#1	0.000	0.000	NE INLET



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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3	57.120	57.120	83.04	3.94
#2	16.050	16.050	36.43	1.36
#1	1.500	74.670	114.68	5.43

Structure Detail:

Structure #3 (Riprap Channel)

NE INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	25.5			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	83.04 cfs	
Depth:	0.36 ft	
Top Width:	12.19 ft	
Velocity*:		
X-Section Area:	4.05 sq ft	
Hydraulic Radius:	0.329 ft	
Froude Number*:		
Manning's n*:		
Dmin:	6.00 in	
D50:	18.00 in	
Dmax:	22.50 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #2 (Riprap Channel)

NW INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	23.4			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	36.43 cfs	
Depth:	0.22 ft	
Top Width:	11.32 ft	
Velocity*:		
X-Section Area:	2.34 sq ft	
Hydraulic Radius:	0.205 ft	
Froude Number*:		
Manning's n*:		
Dmin:	4.00 in	
D50:	12.00 in	
Dmax:	15.00 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #1 (Null)

POND 501

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#3	1	57.120	0.164	0.000	0.000	89.000	M	83.04	3.944
	Σ	**57.120**						**83.04**	**3.944**
#2	1	16.050	0.004	0.000	0.000	89.000	M	36.43	1.362
	Σ	**16.050**						**36.43**	**1.362**
#1	1	1.500	0.014	0.000	0.000	89.000	M	3.40	0.127
	Σ	**74.670**						**114.68**	**5.433**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.04	1.00	96.28	3.050	0.008
		5. Nearly bare and untilled, and alluvial valley fans	29.72	37.00	124.50	5.450	0.006
#1	**1**	**Time of Concentration:**					**0.014**
#2	1	8. Large gullies, diversions, and low flowing streams	2553.95	1,021.58	40.00	151.600	0.000
		5. Nearly bare and untilled, and alluvial valley fans	18.76	13.00	69.29	4.330	0.004
#2	**1**	**Time of Concentration:**					**0.004**
#3	1	8. Large gullies, diversions, and low flowing streams	2.00	48.00	2,398.44	4.240	0.157
		5. Nearly bare and untilled, and alluvial valley fans	20.27	25.00	123.33	4.500	0.007
#3	**1**	**Time of Concentration:**					**0.164**

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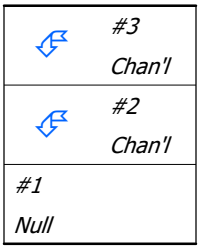
General Information

Storm Information:

Storm Type:	NM TYPE II 70
Design Storm:	10 yr - 6 hr
Rainfall Depth:	1.250 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	POND 501
Channel	#2	==>	#1	0.000	0.000	NW INLET
Channel	#3	==>	#1	0.000	0.000	NE INLET



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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3	57.120	57.120	38.63	1.74
#2	16.050	16.050	18.20	0.60
#1	1.500	74.670	52.15	2.39

Structure Detail:

Structure #3 (Riprap Channel)

NE INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	25.5			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	38.63 cfs	
Depth:	0.21 ft	
Top Width:	11.27 ft	
Velocity*:		
X-Section Area:	2.25 sq ft	
Hydraulic Radius:	0.198 ft	
Froude Number*:		
Manning's n*:		
Dmin:	4.00 in	
D50:	12.00 in	
Dmax:	15.00 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #2 (Riprap Channel)

NW INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	23.4			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	18.20 cfs	
Depth:	0.12 ft	
Top Width:	10.75 ft	
Velocity*:		
X-Section Area:	1.29 sq ft	
Hydraulic Radius:	0.120 ft	
Froude Number*:		
Manning's n*:		
Dmin:	3.00 in	
D50:	9.00 in	
Dmax:	11.25 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #1 (Null)

POND 501

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#3	1	57.120	0.164	0.000	0.000	89.000	M	38.63	1.737
	Σ	**57.120**						**38.63**	**1.737**
#2	1	16.050	0.004	0.000	0.000	89.000	M	18.20	0.600
	Σ	**16.050**						**18.20**	**0.600**
#1	1	1.500	0.014	0.000	0.000	89.000	M	1.70	0.056
	Σ	**74.670**						**52.15**	**2.393**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	1.04	1.00	96.28	3.050	0.008
		5. Nearly bare and untilled, and alluvial valley fans	29.72	37.00	124.50	5.450	0.006
#1	**1**	**Time of Concentration:**					**0.014**
#2	1	8. Large gullies, diversions, and low flowing streams	2553.95	1,021.58	40.00	151.600	0.000
		5. Nearly bare and untilled, and alluvial valley fans	18.76	13.00	69.29	4.330	0.004
#2	**1**	**Time of Concentration:**					**0.004**
#3	1	8. Large gullies, diversions, and low flowing streams	2.00	48.00	2,398.44	4.240	0.157
		5. Nearly bare and untilled, and alluvial valley fans	20.27	25.00	123.33	4.500	0.007
#3	**1**	**Time of Concentration:**					**0.164**

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POND 502
10 YR 6HR

Inlet channels are designed fora 10 yr-6hr storm event.

Pond capacity is designed for a 100 yr 6 hr storm event.

RY

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POND 502
100 YR 6HR

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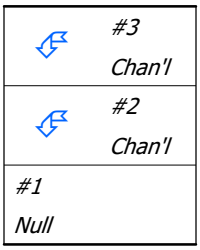
General Information

Storm Information:

Storm Type:	NM TYPE II 70
Design Storm:	100 yr - 6 hr
Rainfall Depth:	1.990 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	POND 502
Channel	#2	==>	#1	0.000	0.000	N INLET
Channel	#3	==>	#1	0.000	0.000	W INLET



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3	51.960	51.960	117.93	4.41
#2	2.380	2.380	5.40	0.20
#1	2.210	56.550	128.35	4.80

Structure Detail:

Structure #3 (Riprap Channel)

W INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	22.8			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	117.93 cfs	
Depth:	0.52 ft	
Top Width:	13.10 ft	
Velocity*:		
X-Section Area:	5.96 sq ft	
Hydraulic Radius:	0.449 ft	
Froude Number*:		
Manning's n*:		
Dmin:	7.00 in	
D50:	21.00 in	
Dmax:	26.25 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #2 (Riprap Channel)

N INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	30.6			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	5.40 cfs	
Depth:	0.03 ft	
Top Width:	10.18 ft	
Velocity*:		
X-Section Area:	0.30 sq ft	
Hydraulic Radius:	0.030 ft	
Froude Number*:		
Manning's n*:		
Dmin:	3.00 in	
D50:	9.00 in	
Dmax:	11.25 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #1 (Null)

POND 502

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#3	1	51.960	0.007	0.000	0.000	89.000	M	117.93	4.408
	Σ	**51.960**						**117.93**	**4.408**
#2	1	2.380	0.026	0.000	0.000	89.000	M	5.40	0.202
	Σ	**2.380**						**5.40**	**0.202**
#1	1	2.210	0.020	0.000	0.000	89.000	M	5.02	0.187
	Σ	**56.550**						**128.35**	**4.797**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	7.36	8.00	108.63	8.140	0.003
		5. Nearly bare and untilled, and alluvial valley fans	7.99	14.00	175.31	2.820	0.017
#1	**1**	**Time of Concentration:**					**0.020**
#2	1	8. Large gullies, diversions, and low flowing streams	6.35	40.00	630.28	7.550	0.023
		5. Nearly bare and untilled, and alluvial valley fans	23.12	13.00	56.22	4.800	0.003
#2	**1**	**Time of Concentration:**					**0.026**
#3	1	8. Large gullies, diversions, and low flowing streams	33.15	70.00	211.18	17.270	0.003
		5. Nearly bare and untilled, and alluvial valley fans	17.88	13.00	72.71	4.220	0.004
#3	**1**	**Time of Concentration:**					**0.007**

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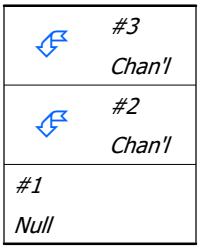
General Information

Storm Information:

Storm Type:	NM TYPE II 70
Design Storm:	10 yr - 6 hr
Rainfall Depth:	1.250 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	POND 502
Channel	#2	==>	#1	0.000	0.000	N INLET
Channel	#3	==>	#1	0.000	0.000	W INLET



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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3	51.960	51.960	58.93	1.94
#2	2.380	2.380	2.70	0.09
#1	2.210	56.550	64.14	2.11

Structure Detail:

Structure #3 (Riprap Channel)

W INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	22.8			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	58.93 cfs	
Depth:	0.32 ft	
Top Width:	11.94 ft	
Velocity*:		
X-Section Area:	3.54 sq ft	
Hydraulic Radius:	0.294 ft	
Froude Number*:		
Manning's n*:		
Dmin:	4.00 in	
D50:	12.00 in	
Dmax:	15.00 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #2 (Riprap Channel)

N INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	30.6			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	2.70 cfs	
Depth:	0.02 ft	
Top Width:	10.10 ft	
Velocity*:		
X-Section Area:	0.16 sq ft	
Hydraulic Radius:	0.016 ft	
Froude Number*:		
Manning's n*:		
Dmin:	3.00 in	
D50:	9.00 in	
Dmax:	11.25 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #1 (Null)

POND 502

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#3	1	51.960	0.007	0.000	0.000	89.000	M	58.93	1.941
	Σ	**51.960**						**58.93**	**1.941**
#2	1	2.380	0.026	0.000	0.000	89.000	M	2.70	0.089
	Σ	**2.380**						**2.70**	**0.089**
#1	1	2.210	0.020	0.000	0.000	89.000	M	2.51	0.083
	Σ	**56.550**						**64.14**	**2.113**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	7.36	8.00	108.63	8.140	0.003
		5. Nearly bare and untilled, and alluvial valley fans	7.99	14.00	175.31	2.820	0.017
#1	**1**	**Time of Concentration:**					**0.020**
#2	1	8. Large gullies, diversions, and low flowing streams	6.35	40.00	630.28	7.550	0.023
		5. Nearly bare and untilled, and alluvial valley fans	23.12	13.00	56.22	4.800	0.003
#2	**1**	**Time of Concentration:**					**0.026**
#3	1	8. Large gullies, diversions, and low flowing streams	33.15	70.00	211.18	17.270	0.003
		5. Nearly bare and untilled, and alluvial valley fans	17.88	13.00	72.71	4.220	0.004
#3	**1**	**Time of Concentration:**					**0.007**

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POND 503
10 YR 6HR

Inlet channels are designed fora 10 yr-6hr storm event.

Pond capacity is designed for a 100 yr 6 hr storm event.

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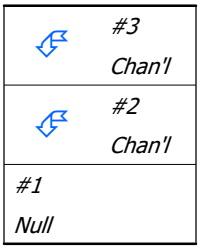
General Information

Storm Information:

Storm Type:	NM TYPE II 70
Design Storm:	10 yr - 6 hr
Rainfall Depth:	1.250 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	POND 503
Channel	#2	==>	#1	0.000	0.000	NW INLET
Channel	#3	==>	#1	0.000	0.000	SW INLET



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3	1.730	1.730	1.96	0.06
#2	224.850	224.850	73.67	6.70
#1	2.880	229.460	74.31	6.88

Structure Detail:

Structure #3 (Riprap Channel)

SW INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	28.1			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	1.96 cfs	
Depth:	0.01 ft	
Top Width:	10.08 ft	
Velocity*:		
X-Section Area:	0.14 sq ft	
Hydraulic Radius:	0.014 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #2 (Riprap Channel)

NW INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	14.3			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	73.67 cfs	
Depth:	0.51 ft	
Top Width:	13.07 ft	
Velocity*:		
X-Section Area:	5.89 sq ft	
Hydraulic Radius:	0.445 ft	
Froude Number*:		
Manning's n*:		
Dmin:	4.00 in	
D50:	12.00 in	
Dmax:	15.00 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #1 (Null)

POND 503

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#3	1	1.730	0.019	0.000	0.000	89.000	M	1.96	0.065
	Σ	**1.730**						**1.96**	**0.065**
#2	1	224.850	0.717	0.000	0.000	89.000	M	73.67	6.704
	Σ	**224.850**						**73.67**	**6.704**
#1	1	2.880	0.025	0.000	0.000	89.000	M	3.27	0.108
	Σ	**229.460**						**74.31**	**6.876**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	17.50	67.00	382.95	4.180	0.025
#1	**1**	**Time of Concentration:**					**0.025**
#2	1	8. Large gullies, diversions, and low flowing streams	4.58	57.00	1,245.50	6.410	0.053
		5. Nearly bare and untilled, and alluvial valley fans	2.25	80.00	3,562.00	1.490	0.664
#2	**1**	**Time of Concentration:**					**0.717**
#3	1	8. Large gullies, diversions, and low flowing streams	14.90	17.00	114.12	11.570	0.002
		5. Nearly bare and untilled, and alluvial valley fans	13.11	30.00	228.90	3.620	0.017
#3	**1**	**Time of Concentration:**					**0.019**

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POND 503
100 YR 6HR

Inlet channels are designed fora 10 yr-6hr storm event.

Pond capacity is designed for a 100 yr 6 hr storm event.

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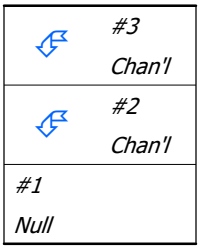
General Information

Storm Information:

Storm Type:	NM TYPE II 70
Design Storm:	100 yr - 6 hr
Rainfall Depth:	1.990 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	POND 503
Channel	#2	==>	#1	0.000	0.000	NW INLET
Channel	#3	==>	#1	0.000	0.000	SW INLET



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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3	1.730	1.730	3.93	0.15
#2	224.850	224.850	170.14	15.22
#1	2.880	229.460	171.36	15.61

Structure Detail:

Structure #3 (Riprap Channel)

SW INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	28.1			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	3.93 cfs	
Depth:	0.03 ft	
Top Width:	10.15 ft	
Velocity*:		
X-Section Area:	0.25 sq ft	
Hydraulic Radius:	0.025 ft	
Froude Number*:		
Manning's n*:		
Dmin:	2.00 in	
D50:	6.00 in	
Dmax:	7.50 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #2 (Riprap Channel)

NW INLET

Trapezoidal Riprap Channel Inputs:

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
10.00	3.0:1	3.0:1	14.3			

Riprap Channel Results:

Simons/OSM Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	170.14 cfs	
Depth:	0.89 ft	
Top Width:	15.33 ft	
Velocity*:		
X-Section Area:	11.25 sq ft	
Hydraulic Radius:	0.720 ft	
Froude Number*:		
Manning's n*:		
Dmin:	6.00 in	
D50:	18.00 in	
Dmax:	22.50 in	

Velocity and Manning's n calculations may not apply for this method.

Structure #1 (Null)

POND 503

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#3	1	1.730	0.019	0.000	0.000	89.000	M	3.93	0.147
	Σ	**1.730**						**3.93**	**0.147**
#2	1	224.850	0.717	0.000	0.000	89.000	M	170.14	15.218
	Σ	**224.850**						**170.14**	**15.218**
#1	1	2.880	0.025	0.000	0.000	89.000	M	6.54	0.244
	Σ	**229.460**						**171.36**	**15.609**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	17.50	67.00	382.95	4.180	0.025
#1	**1**	**Time of Concentration:**					**0.025**
#2	1	8. Large gullies, diversions, and low flowing streams	4.58	57.00	1,245.50	6.410	0.053
		5. Nearly bare and untilled, and alluvial valley fans	2.25	80.00	3,562.00	1.490	0.664
#2	**1**	**Time of Concentration:**					**0.717**
#3	1	8. Large gullies, diversions, and low flowing streams	14.90	17.00	114.12	11.570	0.002
		5. Nearly bare and untilled, and alluvial valley fans	13.11	30.00	228.90	3.620	0.017
#3	**1**	**Time of Concentration:**					**0.019**