Exterior Building Color & Material Samples (Photo)
Color Drawdowns
Drainage Reports
TIMA
Abbreveated Water & Sewer Need Report
Archaeological Resources
Airport Vicinity Development Checklist
Parking Study
Parking Master Plan
Water Study
Wastewater Study
Stormwater Waiver Application

A Class III Cultural Resources Survey of 91 Acres for DM19, LLC at Desert Mountain near Cave Creek Road and Pima Road, Scottsdale, Maricopa County, Arizona

Prepared for:

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Submittal #1

LSD Technical Report No. 165088

ABSTRACT AND MANAGEMENT SUMMARY

Report Title	A Class III Cultural Resources Survey of 91 Acres for DM19, LLC at Desert Mountain near Cave Creek Road and Pima Road, Scottsdale, Maricopa County, Arizona
Report Date	March 15, 2016 (Submittal #1)
Agencies Involved	N/A
Land Ownership	Private, Desert Mountain Home Owner's Association
LSD Project No.	165088
Project Description	DM19, LLC requested Logan Simpson conduct a Class III archaeological survey of the 91-acre Desert Mountain parcel as part of the due diligence process prior to a proposed purchase of the parcel. The Desert Mountain parcel is zoned for residential housing.
Project Location	Within the City of Scottsdale, Arizona, along Cave Creek Road and near Pima Road. Within portions of the NW¼ and the N½ of the SW¼ of Section 31, T6N, R5E, Gila and Salt River Baseline and Meridian (USGS 7.5' Cave Creek, Ariz., 1965/1981).
Project UTMs	NAD83 Zone 12 Northwest corner – 417533 mE, 3743129 mN Northeast corner – 417827 mE, 3743365 mN Southeast corner – 418350 mE, 3742868 mN Southwest corner – 417541 mE, 3742678 mN
Fieldwork Dates	March 10, 2014
Acres Surveyed	91
Methods	Pedestrian survey spaced at 15-m intervals
Number of Cultural Resources	1 previously recorded site and 9 isolated occurrences (IOs)
Register eligibility Indeterminate sites	1 AZ U:1:433(ASM)

Summary

The Class III cultural resources survey of the 91-acre parcel resulted in the identification of 1 previously recorded site—AZ U:1:433(ASM). In addition to the site, 9 IOs were identified. The IOs are not eligible for inclusion in the Arizona Register of Historic Places (ARHP) or National Register of Historic Places (NRHP), and no additional research or preservation of the IOs is required.

A formal recommendation of eligibility for AZ U:1:433(ASM) could not be made based on surface observations. An eligibility recommendation would only be possible following the implementation of an archaeological testing program. If avoidance is not possible AZ U:1:433(ASM) should be subjected to an appropriate archaeological testing program to determine whether buried deposits are present and to formally evaluate its NRHP eligibility.

If previously unrecorded cultural resources are encountered during ground-disturbing activities, these activities must be discontinued in the immediate vicinity of the discovery, and work should not resume until a qualified archaeologist has been notified and allowed time to properly address the nature and significance of the discovery.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOGRAPHS

INTRODUCTION

DM19, LLC requested that Logan Simpson perform a Class III cultural resources survey of the approximate 91-acre Desert Mountain parcel as due diligence for a proposed private development project. The parcel is situated at the western edge of the Desert Mountain development (Photograph 1), which is located north of the intersection of Pima and Cave Creek roads in north Scottsdale, Maricopa County (Figure 1). The survey area is an irregular polygon that measures approximately 0.5 mile north-south and 0.5 mile east-west and is within Section 31, T6N, R5E, Gila and Salt River Baseline and Meridian (G&SRB&M) (USGS 7.5' Cave Creek 1965/1981) (Figure 2). Five pumping stations and an existing fire station within the parcel are excluded from the survey area.

All land within the project area is private property owned by the Desert Mountain Home Owner's Association. DM19, LLC is considering purchase of the parcel for future development. As such, the cultural resources survey was conducted in voluntary compliance with the Arizona Burial Law (A.R.S. §41-844 and §41-865), and as due diligence prior to purchase of the property.

Photograph 1. Representative overview of the project area, view to north.

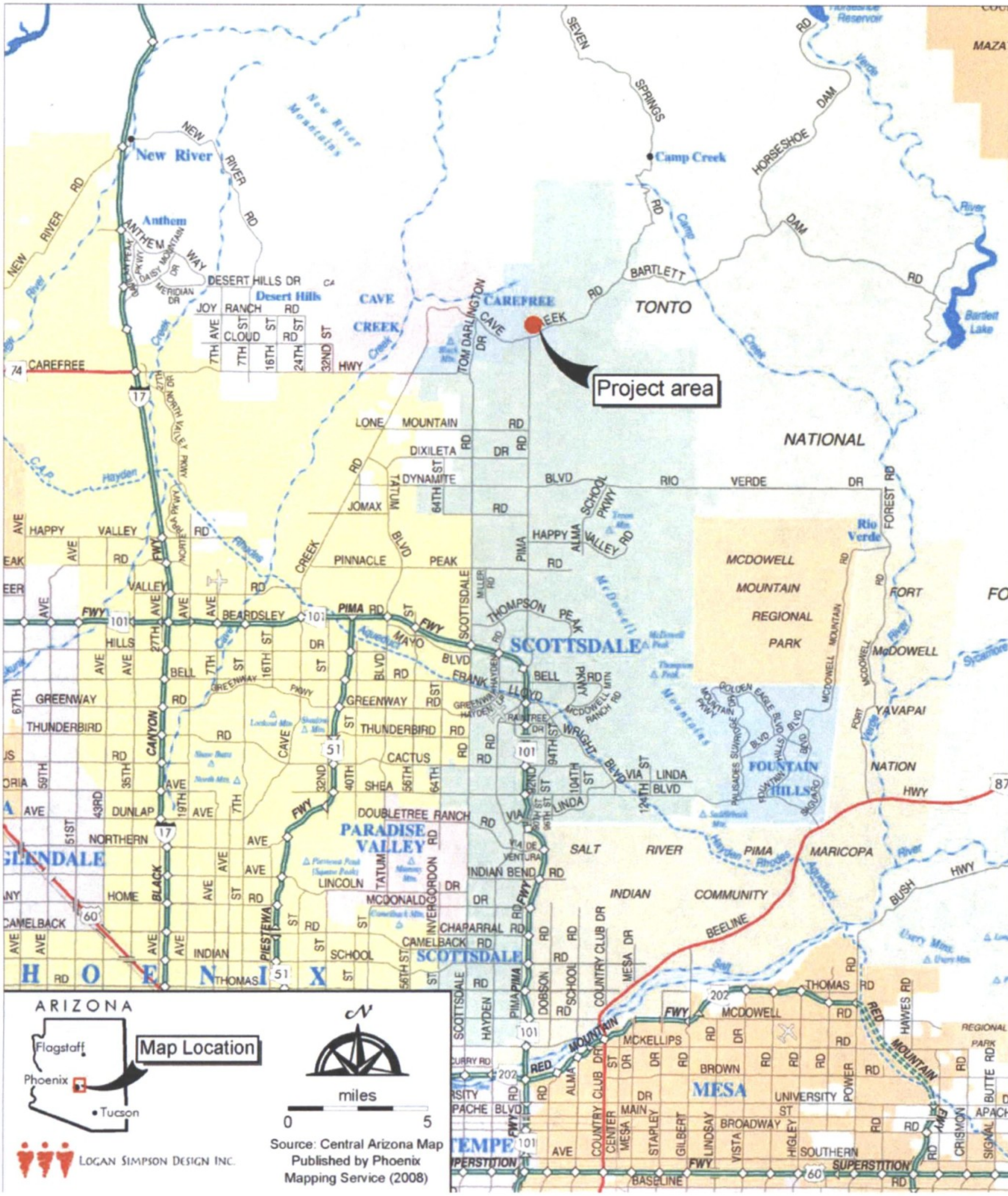
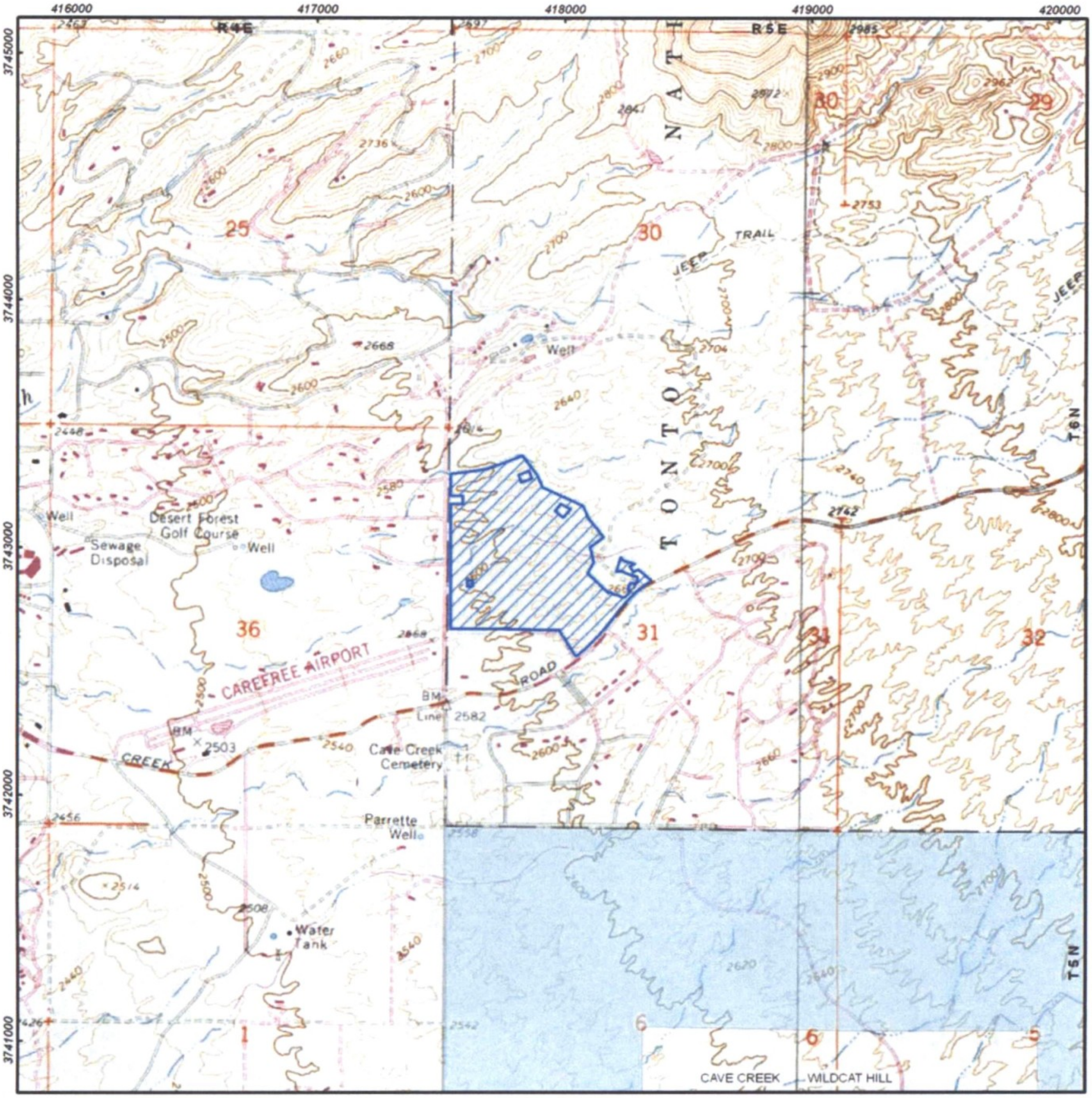


Figure 1. Project location.



Source: USGS 7.5' Quadrangles
Cave Creek, Ariz. (1965, 1981);
Wildcat Hill, Ariz. (1965, 1981)
NAD 1983, UTM Zone 12

Key

Survey area

Land Jurisdition

Private Land

State Trust Land

0 2000 ft

0 500 m

LOGAN SIMPSON DESIGN INC.

Figure 2. Location of survey area and land jurisdiction.

PHYSICAL SETTING

The project area is situated at an approximate elevation of 2,600 ft above mean sea level (amsl) and is located in the Basin and Range physiographic province, which is characterized by low desert surrounded by fault-block mountain ranges (Chronic 1983). The region is part of the Lower Colorado River Valley subdivision of the Sonoran Desertscrub biotic community (Turner and Brown 1994), which has high temperatures and generally low precipitation. The vegetation in the area includes yucca, palo verde trees, mesquite trees, saguaro, ocotillo, and cholla. The largest drainage in the vicinity is an unnamed branch of the Galloway Wash that runs east-west through the center of the project area. Topographic features surrounding the project area include Lone Mountain approximately 1.5 miles to the northeast and Black Mountain approximately 3 miles to the southwest. The local geology consists of pre-Cambrian granite and metasedimentary rocks and Cenozoic alluvial deposits. Ground visibility was fair, averaging 50 to 75 percent open.

CULTURAL HISTORY

Human presence in the Southwest began as long as 11,000 years ago. The initial period of occupation, during the Paleoindian period dating from approximately 9500 B.C. to 8500 B.C., appears to have been intermittent, given the limited amount of recovered evidence. The evidence consists primarily of isolated surface finds of Clovis points, as well as buried megafaunal kill sites in alluvial contexts that have yielded associated lithic assemblages (Haynes 1980). Based on these scant data, the period appears to be characterized by dispersed mobile groups that primarily hunted now-extinct megafauna and possibly supplemented their diet with collected wild plant materials (Waters 1986). Although only a few artifactual surface finds have been reported in the general region (Agenbroad 1967; Huckell 1982; North et al. 2004; North et al. 2005), it is likely that most Paleoindian period remains are currently buried by substantial Holocene alluvial deposits or destroyed by erosion. Three isolated points have been found in the northern periphery of the Phoenix Basin (Crownover 1994; Huckell 1982; North et al. 2005), representing the only known evidence, to date, of Paleoindian occupation or use of the Phoenix Basin.

Following climatic amelioration and the extinction of the previously exploited fauna, a new cultural pattern emerged, the Southwestern Archaic, manifested by small, mobile, residential groups that hunted medium-sized to small game and foraged for a diversity of floral resources. This adaptive pattern persisted through the Early (8500 B.C. to 5000 B.C.) and Middle (5000 B.C. to 1500 B.C.) Archaic periods, although there was a trend toward an increased reliance on migratory patterns based on seasonally available foodstuffs, as evidenced by the increased prevalence of grinding tools in the artifact assemblage. By the Late Archaic period (1500 B.C. to A.D. 1/150), some of the Archaic groups occupied well-watered upland locations or locales along primary or secondary stream courses where crops could be planted. In these locations they adopted maize horticulture, maintained substantial storage facilities, and established a semisedentary subsistence-settlement pattern (Huckell 1995; Mabry 1998). Around 500 B.C. large, seasonally occupied villages, some with communal structures, were established in some areas of southern Arizona (Mabry 1998). These villages centered around floodplain maize agriculture and riparian resources but continued the exploitation of upland bajada resources. In nonriverine desert areas, however, the tradition of hunting and foraging, accompanied by increased sedentism, appears to have persisted at least through the end of the Archaic period (Halbirt and Henderson 1993). Late Archaic semisedentary settlements, such as those identified in upland and riverine areas to the south in the Tucson Basin and parts of southeastern Arizona (Huckell 1995; Mabry 1998; Roth 1992), have yet to be identified in the Phoenix Basin. If present, these settlements undoubtedly would be situated in floodwater agriculture areas along river terraces that are currently deeply buried in alluvium.

The succeeding Early Formative period, dating between A.D. 1 and approximately A.D. 700, is characterized primarily by the introduction and early development of plain ware ceramics. This period can be considered a period of transition, during which sedentism and the reliance on horticulture increased throughout the general region. In specific areas, such as the Tucson Basin where both Late Archaic and Early Formative villages have been recorded, settlement location reflects a general continuity from the Late Archaic period. Current understanding of the initial phase of the early Formative period in the Salt-Gila River area, the Red Mountain phase (A.D. 1 to 450), however, is limited to data derived from a few sites and site components in the Phoenix Basin (Mabry 2000). The Red Mountain phase—which is represented by the earliest component at Pueblo Patricio (Cable and Doyel 1987; Henderson 1995), La Escuela Cuba (Hackbarth 1992), the Red Mountain site (Morris 1969), and limited activity sites (Hackbarth 1998; Kenny 1987; Phillips et al. 2001; Rogge 2009) is characterized by groups of small pit houses of varying configurations that composed small semisedentary hamlets. The mortuary pattern is characterized principally by flexed inhumations, although secondary cremations have also been documented (Mabry 2000).

The Vahki, Estrella, and Sweetwater phases, along with the Snaketown phase, traditionally make up the Pioneer period in Hohokam cultural chronology (Gladwin et al. 1937; Haury 1976). The Pioneer period has undergone some recent reevaluation regarding the origins and development of the Hohokam (Dean 1991; Wallace et al. 1995). The placement of these phases (A.D. 450 to 700) is based on the available limited excavation and artifact data and can best be characterized as a continuation of the broad regional Early Formative-period cultural development, with the beginnings of a cultural pattern that was developing in the Phoenix Basin.

During the Vahki phase, both micaceous plain ware and red ware ceramics were produced and a figurine complex developed. Other characteristics of this phase include settlements with plaza-oriented layouts, the construction of large Type P-4 houses that were first identified at Snaketown (Gladwin et al. 1937; Haury 1976:68; Wilcox et al. 1981), and a mortuary pattern that incorporated both pit and trench cremations and flexed and semiflexed inhumations (Doyel 1991). The following Estrella and Sweetwater phases are characterized primarily by the production of grooved and decorated red-on-gray ceramics. Although the square P-4 houses continued to be constructed, they were smaller in size than those of the Vahki phase and co-occurred with the smaller structures. The presence of some intrusive elements, including evidence of macaws and parrots, shell, and turquoise at principal settlements such as Snaketown, suggests the development of regional interaction patterns.

The emergence of the Hohokam as an integrated cultural pattern occurred possibly as early as A.D. 700 during the Snaketown phase, although a much earlier origin beginning in the Vahki phase originally had been proposed (Gladwin et al. 1937). Recent assessments have suggested that the suite of cultural traits and developments that marked the beginnings of regional cultural differentiation and that characterized the Hohokam does not appear to be fully established until the Snaketown phase or possibly as late as the middle of the Gila Butte phase of the Colonial period, beginning around A.D. 750 (Dean 1991; Doyel 1991; Wallace et al. 1995; Wilcox 1979; Wilcox and Sternberg 1983). These traits, which reflect the development of an integrated belief and ritual system and the inception of a regional system, include the adoption of public architectural forms, such as ballcourts, into the settlement structure and the development of a characteristic mortuary complex, large-scale irrigation agriculture, and naturalistic iconography in decorated ceramics.

Throughout the pre-Classic period, between A.D. 700 and approximately A.D. 1150, the Phoenix Basin can be considered the primary focus of Hohokam regional development. During the Snaketown phase of the Pioneer period, the emerging Hohokam cultural pattern was manifested by the first documented construction of canals (Henderson 1989; Wilcox and Shenk 1977) and urn burials (Haury 1976). Trash mounds appeared during this period, and one at Snaketown was capped with caliche, possibly a precursor to the later platform mounds (Haury 1976). Evidence of Hohokam occupation or interaction is first identified outside the Phoenix Basin in locations such as the lower Verde River and in the Tucson Basin (Crown 1991).

The establishment of numerous villages throughout the region, including peripheral areas along secondary drainages where canal irrigation was not feasible, characterizes the Colonial period. Habitation sites consisting of courtyard groups focused on a common living or workspace represented a frequent pattern of settlement organization during this period (Howard 1985; Wilcox et al. 1981). At smaller hamlets and villages consisting of one or two courtyard groups, trash mounds, cemetery areas, and roasting pits tended to be arrayed around the margins of the courtyard. At larger villages composed of clusters of courtyard groups, central plazas and communal cemeteries and work areas were probably incorporated into the village structural layout (Howard 1985; Wilcox and Sternberg 1983). The introduction of ballcourts at some of these villages, at least by the Gila Butte phase, suggests the beginnings of site functional differentiation and intercommunity integration. Ballcourts, as a widespread form of public architecture, increased in number and expanded in areal extent throughout the Colonial period. By the Sedentary period, ballcourts were represented not only in the Phoenix Basin but in surrounding areas as well.

The Santa Cruz phase of the Colonial period and the Sacaton phase of the Sedentary period were times of substantial growth in the number and size of Hohokam settlements and ballcourt villages and in the extent of the canal networks in the Phoenix Basin (Doyel 1991). In peripheral drainage areas, the number of villages, hamlets, and farmsteads also increased. Nonirrigation agricultural intensification and the intensive use of agricultural rock piles for the cultivation of crops, such as agave and cholla, appear to have developed at least by the late Sedentary or early Classic periods (Fish et al. 1992; Masse 1991).

By the beginning of the early Classic period, change in the structure of Hohokam communities is evidenced by a shift in burial practices from primarily cremations to inhumations, a change in regional exchange networks as reflected by the shift in the production and distribution of ceramic types and exotic materials, and the development of new domestic and public architectural forms, including post-reinforced and adobe-walled structures and walled compounds. The decline and eventual collapse of the ballcourt system and the development of the platform mound also occurred during this period (Gregory 1987). The platform mound architectural form, developed during the late Sedentary period, represented an important architectural component of a new community organization that was manifested in Hohokam settlements not only in the Phoenix Basin but also in other settlements over a much wider region, including the Tonto and Tucson basins and along the lower San Pedro River. The platform mound apparently evolved in function from an initial nonresidential, special-purpose facility to a residence used by a specific residential group (Gregory 1991). More recent study of the Pueblo Grande platform mound directly challenges the idea that the Civano-phase mounds were the full-time residences of elite households and further supports the proposition that power was diffuse at that time (see Downum and Bostwick 2003).

In conjunction with this Classic-period community restructuring, a hierarchy of settlement types also emerged. These included villages with only one or a few walled residential compounds; villages with one or more platform mound compounds as well as other compounds; and large settlements, such as Casa Grande, with a platform mound and numerous compounds, a ballcourt, and a Great House (Wilcox 1991). These various Classic-period settlements may have composed distinct irrigation communities: sociopolitical organizations consisting of a number of integrated villages that included one or more platform mound villages serving as administrative centers and distributed along a single canal or canal system (Howard 1987). One view of the terminal period of prehistoric occupation in the Phoenix Basin is the tentatively defined and dated Polvorón phase (Doyel 1995; Sires 1983). As originally defined, occupation during the Polvorón phase is represented by dispersed ranchería settlements, consisting of individual pit structures or jacal rooms arranged in clusters. In some cases, however, late Classic-period compounds were reoccupied (Crown and Sires 1984; Doyel 1995; Sires 1983). This perspective treats the phase as a period of abrupt change in community organization and integration in the aftermath of the collapse of the late Classic-period platform mound communities. The end of the Hohokam is explained as following a period of drought and flood conditions that substantially reduced or destroyed the irrigation systems on which these communities relied (Doyel 1995; Nials et al. 1989). However, researchers continue to debate whether the phase is valid. For example, Henderson and Hackbarth (2000), on the basis of overlapping dates between the Civano and Polvorón phases, argue that the characteristics of the latter are not temporally discrete but rather a reflection of cultural variability within the Classic period. Alternatively, Chenault (2000:277) argues ". . . that not to separate Polvorón from the Civano phase obscures variability and change at the end of the cultural sequence that may relate to the nature and causes of the Hohokam collapse." Hill and colleagues (2004), on the other hand, take a broader perspective of regional Hohokam settlement change and suggest that population decline over multiple generations was intertwined with immigration and community coalescence.

By the time of Spanish contact in the mid- to late sixteenth century, the Pima and Maricopa occupied the middle portion of the Gila River. The Pima have been traditionally considered the descendants of the Hohokam in the Phoenix Basin (Doyel 1991; Haury 1976), although the validity of this particular prehistoric-historic connection has been debated (Doelle 1981; Masse 1991). The mountainous areas north and west of the Salt River were largely occupied by the Yavapai. Gifford (1932, 1936) considered the Yavapai most closely aligned in terms of cultural traits with the upland Yuman Walapai and Havasupai of northwestern Arizona.

Euro-American incursion into the area occurred after 1846 as a result of the Mexican-American War and its aftermath, with incursions of the military, explorers, surveyors, immigrants, and finally settlers. The war ended in 1848 with the signing of the Treaty of Guadalupe Hidalgo. The American era (A.D. 1853–1950) began with the Gadsden Purchase of 1853, when modern-day southern Arizona became part of the United States. The late 1800s saw an influx of settlement into the Salt River Valley, encouraged by a series of national public land laws, such as the National Homestead Act (1862), Timber Culture Act (1873), Desert Land Act (1877), and Enlarged Homestead Act (1909) (Bostwick and Rice 1987; Stein 1990). The majority of homesteads filed in Arizona during this period were along the Salt River (Stein 1990). By the 1870s, many settlers in the area were extensively cultivating land (Arizona Board of Regents 1989). President Roosevelt signed the Reclamation Act of 1902, creating the first national effort to build large-scale irrigation projects in the western United States. Two dams along the Salt River (Granite Reef and Roosevelt) and an extensive canal network in the Phoenix Basin became our nation's flagship reclamation project. The irrigation and electricity provided by this, the Salt River Project, was instrumental in the development of Phoenix during the twentieth century (Zarbin 1986, 1997).

PREVIOUS RESEARCH

Before field survey, archaeological site files and inventory reports were checked at the Arizona State Historic Preservation Office (SHPO) and the Arizona State Museum (ASM) using AZSITE, the state's electronic inventory of cultural resources. The National Register Information System database and City of Scottsdale (COS) Register were also reviewed, and Bureau of Land Management (BLM) maps and title plats were reviewed electronically. The parameters of the record search included the project area and the surrounding one-mile radius. No COS Register or National Register of Historic Places (NRHP)-listed properties are located nearby. The available General Land Office (GLO) maps showing Section 31, T6N, R5E (plats 0234-A and 0234-B, filed 5/9/1960 and 5/24/1961, respectively), shows the Cave Creek Road alignment and a powerline within the project's vicinity, but not within the area to be surveyed.

The records search indicated that 24 projects were previously conducted in the project area and its vicinity (Table 1; Appendix A.1). Of these, 6 surveys occurred within the current project area (Davis 2003a, 2003b; Lausten 2004, Lundin 2001, 2002; Webb and Courtright 2002). Few cultural resources were encountered; however, one site, AZ U:1:433(ASM), was previously recorded in the project area during an 8-acre survey (Lausten 2004).

AZ U:1:433(ASM) is one of four sites that have been recorded in the project vicinity (Table 2; Appendix A.1 and A.2). The site was recorded as a 10 m by 17 m Hohokam artifact scatter consisting of ceramics and flaked stone. No ARHP and NRHP eligibility recommendation was made based on the surface

Table 1. Previous investigation in the project area vicinity.

Reference number	Author and year	Location relative to project area
1979-137.ASM	N/A	Outside
1986-123.ASM	ASM 1986	Outside
1987-243.ASM	RECON 1987	Outside
1990-18.ASM	Irwin 1990	Outside
1995-90.ASM	Crownover 1995	Outside
1997-67.ASM	Adams 1997	Outside
1999-262.ASM	Hackbarth 1999	Outside
2000-31.ASM	Hart 2000	Outside
2000-561.ASM	Lindly and Mitchell 2000	Outside
2001-448.ASM	Hart 2001	Outside
2001-687.ASM	Lundin 2001	Inside
2002-211.ASM	Marshall 2002	Outside
2002-389.ASM	Lundin 2002	Inside
2003-542.ASM	Gage 2003	Outside
2003-1102.ASM	Webb and Courtright 2002	Inside
2004-204.ASM	Davis 2003a, Davis 2003b	Inside
2004-329.ASM	Lausten 2004	Inside
2005-428.ASM	Bellavia and Mitchell 2005a	Outside
2005-1285.ASM	Moore 2005	Outside
2006-66.ASM	Bellavia and Mitchell 2005b	Outside
2006-605.ASM	Schroeder 1995	Outside
2011-236.ASM	N/A	Outside
11-19-1-BLM	N/A	Outside
SHPO-2001-3257	Slawson 2001	Outside

Table 2. Previously recorded sites within the project area vicinity.

Site number	Location	Site type	Affiliation and age	Eligibility status
AZ U:1:134(ASM)	Sec. 1[a]	Fort McDowell/ Stoneman wagon road	Euro-American/ A.D. 1870-1890	Recommended eligible
AZ U:1:136(ASM)	Sec. 1[a]	Trash dump	Euro-American/ A.D. 1884-1940	Not determined
AZ U:1:391(ASM)	Sec. 1[a]	Flaked stone scatter and rock ring	Native American/ Prehistoric	Recommended not eligible
AZ U:1:433(ASM)	Sec. 31[b]	Flaked stone and ceramic scatter	Hohokam/ A.D. 200-1500	Not determined

[a] T5N, R4E, USGS 7.5' Cave Creek, Ariz., 1965/1981.
[b] T6N, 5E, USGS 7.5' Cave Creek, Ariz., 1965/1981.

observations. Subsurface cultural features may be present. One other prehistoric site in the vicinity is also a limited activity area. The other two previously recorded sites are historic, consisting of one wagon road and one trash dump.

SURVEY EXPECTATIONS AND HISTORIC CONTEXT

Based on the physiographic context of the project and because of the relatively few discoveries in the project vicinity, Logan Simpson had low expectations for encountering significant prehistoric or historic cultural resources during the pedestrian survey, such as isolates and no more than two sites. If cultural resources were present, it was expected that they would represent limited activity areas rather than permanent occupations. As such, one local historic context, or theme, was identified in which to evaluate the significance and ARHP and NRHP eligibility of any cultural resources sites identified: *Prehistoric/historic land use in the Carefree Basin and the northern periphery of the Hohokam cultural area*.

SURVEY METHODS

The project area was completely surveyed on March 10, 2014. The fieldwork was supervised by Sean Teeter, M.A., RPA, a permitted field supervisor on Logan Simpson's Arizona Antiquities Act Permit (2014-007bl). Crew members included Leigh Davidson, B.A. (4 years southwestern experience) and Helana Ruter, M.A. (8 years southwestern experience). The project manager is Mark Hackbarth, M.A., RPA, and the report was reviewed by Scott Courtright. Prior to survey, the project area boundary was programmed into a handheld Trimble Geo XM global positioning system (GPS) unit. The project area was surveyed by maintaining parallel transects oriented with a compass and GPS unit spaced no more than 15 m apart, resulting in 100 percent coverage. When cultural remains were encountered, they were assigned a field number, plotted on USGS topographic maps and with the GPS unit, and described in written notes. All Universal Transverse Mercator (UTM) coordinates in this document are in Zone 12 North and based on the North American Datum of 1983, Continental United States datum (NAD 83 CONUS). The Trimble Geo XM GPS unit employs real-time differential correction; any GPS positions not corrected in real-time were post corrected to an accuracy of 1 to 2 m using Pathfinder Office software. Sites, features, diagnostic artifacts, and other relevant features were documented with digital photographs. Ground-surface visibility within the survey area was relatively fair and averaged 50 to 75 percent open. Natural erosion and previous construction activities have disturbed the area.

The site was recorded following ASM site criteria using ASM site cards. Before recording, all artifacts were pin flagged to define site boundary and identify concentrations. A scaled map was drawn of the site to illustrate the artifact concentration, site boundary, and topography. In addition, GPS points were taken at the site and isolated occurrences (IOs) to accurately place the cultural resources on electronic maps. Cultural resources were documented with digital photographs.

Cultural resources were recorded following the ASM *Revised Site Definition Policy* (Fish 1995), which is accepted by the Arizona SHPO. This policy states that sites should contain:

- Physical remains of past human activity that are at least 50 years old.
- Additionally, sites should consist of at least one of the following:

1. 30+ artifacts of a single class (i.e., 30 sherds, 30 lithics, 30 tin cans) within an area 15 meters (50 feet) in diameter, except when all pieces appear to originate from a single source (i.e., one ceramic pot, one core, one glass bottle.
2. 20+ artifacts that include at least 2 classes of artifact types (i.e., sherds, ground stone, nails, glass) within an area 15 meters (50 feet) in diameter.
3. One or more archaeological features in temporal association with any number of artifacts.
4. Two or more temporally associated archaeological features without artifacts.

Cultural resources not meeting site criteria were recorded as IOs.

Identified cultural resources are evaluated for ARHP and NRHP eligibility based on their integrity and significance under the four criteria outlined in 36 CFR 60 and per guideline presented in National Register Bulletin 15, *How to Apply the National Register Criteria for Evaluation.* In order for a historic property to be considered eligible for listing in the NRHP, it must:

- Be associated with events that have made a significant contribution to the broad patterns of our history (Criterion A);
- Be associated with the lives of persons significant in our past (Criterion B); or
- Embody the distinct characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C); or
- Yield, or be likely to yield, information important in prehistory or history (Criterion D).

SURVEY RESULTS

The survey resulted in the identification of one previously recorded site—AZ U:1:433(ASM)—and 9 IOs that include both prehistoric and historic artifacts (Appendix B.1). No new sites were discovered.

Previously Recorded Site

AZ U:1:433(ASM)

ARHP/ NRHP Eligibility: Undetermined
Land Status: Private
Landform: Level area adjacent to unnamed small wash, 2,640 ft amsl
Deposition: Alluvial
Vegetation: Dense thicket of palo verde trees, wolfberry and small shrubs
Soils: Dark brown silt with moderate to high concentration of decomposing cobbles and gravel
Site Size: 30 m by 17 m (510 m^2/0.13 acre)
Site Type: Artifact scatter
Cultural/Temporal Affiliation: Hohokam/A.D. 200–1500

Description:
AZ U:1:433(ASM) consists of a previously recorded artifact scatter with no surface features. The site was originally recorded by Lausten (2004) as partially within a fire station's project area, and partially within the current project area (Figure 3; Appendix B.1). The observed low- to moderate-density artifact assemblage consists of an estimated 300 sherds and 10 flakes. The ceramic assemblage largely consists of Wingfield Plain and Gila Plain sherds and few red ware sherds. Flaked-stone artifacts consist mainly of secondary flakes, and basalt and quartzite are the material types represented. Most of the artifacts are concentrated in a bulldozed area in the northeastern area of the site, bordered by the wash to the north and the fence of a construction storage area to the south (Photograph 2). The artifact concentration (AC1) contains approximately 150 to 200 sherds within a 5 m area.

The site is in poor condition from extensive disturbance created by previous construction and erosion. The installation of a chained-off cleared area used for storage disturbed much of the site. The remainder of the site has been impacted by erosion. Ground cover is moderate to heavy and visibility ranges from 50 to 75 percent open. In addition to the dense thicket of vegetation, piles of construction material and scattered debris obscure the ground surface.

Discussion and Recommendation:

AZ U:1:433(ASM) is a Hohokam artifact scatter and may be eligible for inclusion in the ARHP and NRHP under Criterion D (information potential); however, a formal eligibility recommendation could not be made based on surface observations. An eligibility recommendation would only be possible following the implementation of an archaeological testing program. Although highly disturbed, the site retains integrity of location and setting. The site likely contains intact subsurface cultural deposits that may be able to contribute important information within the context of prehistoric land use within the Carefree Basin and the northern periphery of the Hohokam cultural area. The presence of human remains, while possible, would not be expected.

Isolated Occurrences

In addition to the one previously recorded site, 9 IOs were identified (Table 3; Appendix B.1). The IOs are not eligible for inclusion in the ARHP or the NRHP; they have been fully recorded, and no additional research or preservation is required.

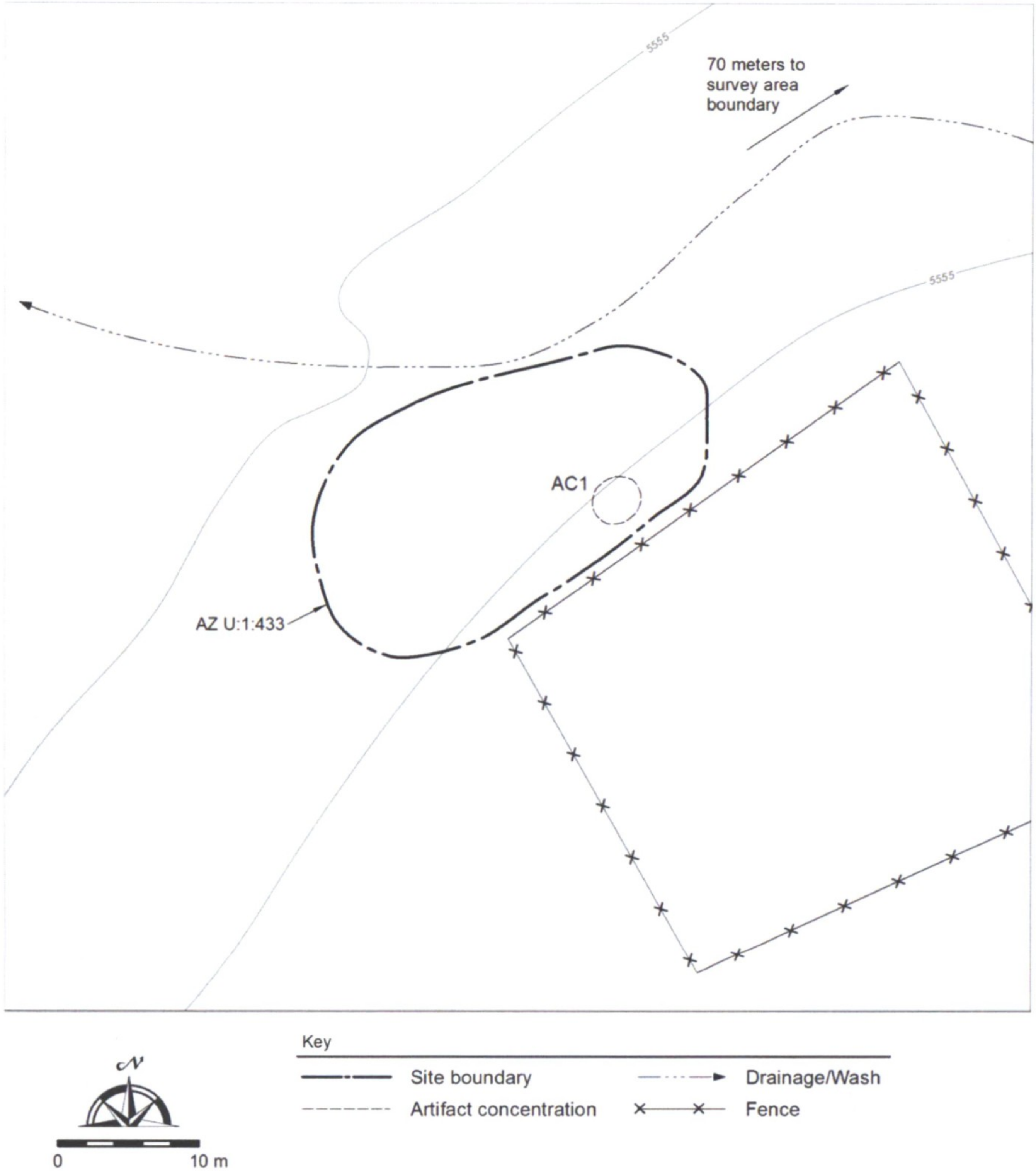


Figure 3. Site map of AZ U:1:433(ASM).

Photograph 2. Overview of AZ U:1:433(ASM), facing north.

Table 3. Isolated occurrences.

IO	Descriptions	UTMs[a] Northing	UTMs[a] Easting
1	1 church key-opened can	3742991	417662
2	1 church key-opened can	3742954	417645
3	1 church key-opened can	3742688	417654
4	1 church key-opened can	3742979	417724
5	1 basalt core	3743173	417789
6	3 church key-opened cans within 6 by 6 m area	3743044	417769
7	1 church key-opened can	3742736	417791
8	1 quartzite core	3743217	417819
9	1 church key-opened can	3743070	417894

[a] UTM Zone 12, NAD 1983 CONUS.

SUMMARY AND RECOMMENDATIONS

The Class III cultural resources survey of the 91-acre parcel of private land resulted in the identification of one previously recorded site—AZ U:1:433(ASM). No new sites were discovered. In addition to the site, 9 IOs were identified. The IOs are not eligible for inclusion in the ARHP or the NRHP, and no additional research or preservation is required. The survey was conducted in voluntary compliance with the Arizona Burial Law (A.R.S. §41-844 and §41-865) and as due diligence prior to purchase of the property for a proposed private development project. It is not possible to determine whether the cultural resources would be affected by the project at this time.

A formal recommendation of eligibility for AZ U:1:433(ASM) could not be made based on surface observations. An eligibility recommendation would only be possible following the implementation of an archaeological testing program. If the parcel is developed and if avoidance is not possible, the site should be subjected to an appropriate archaeological testing program to determine whether buried deposits are present and to formally evaluate its ARHP and NRHP eligibility

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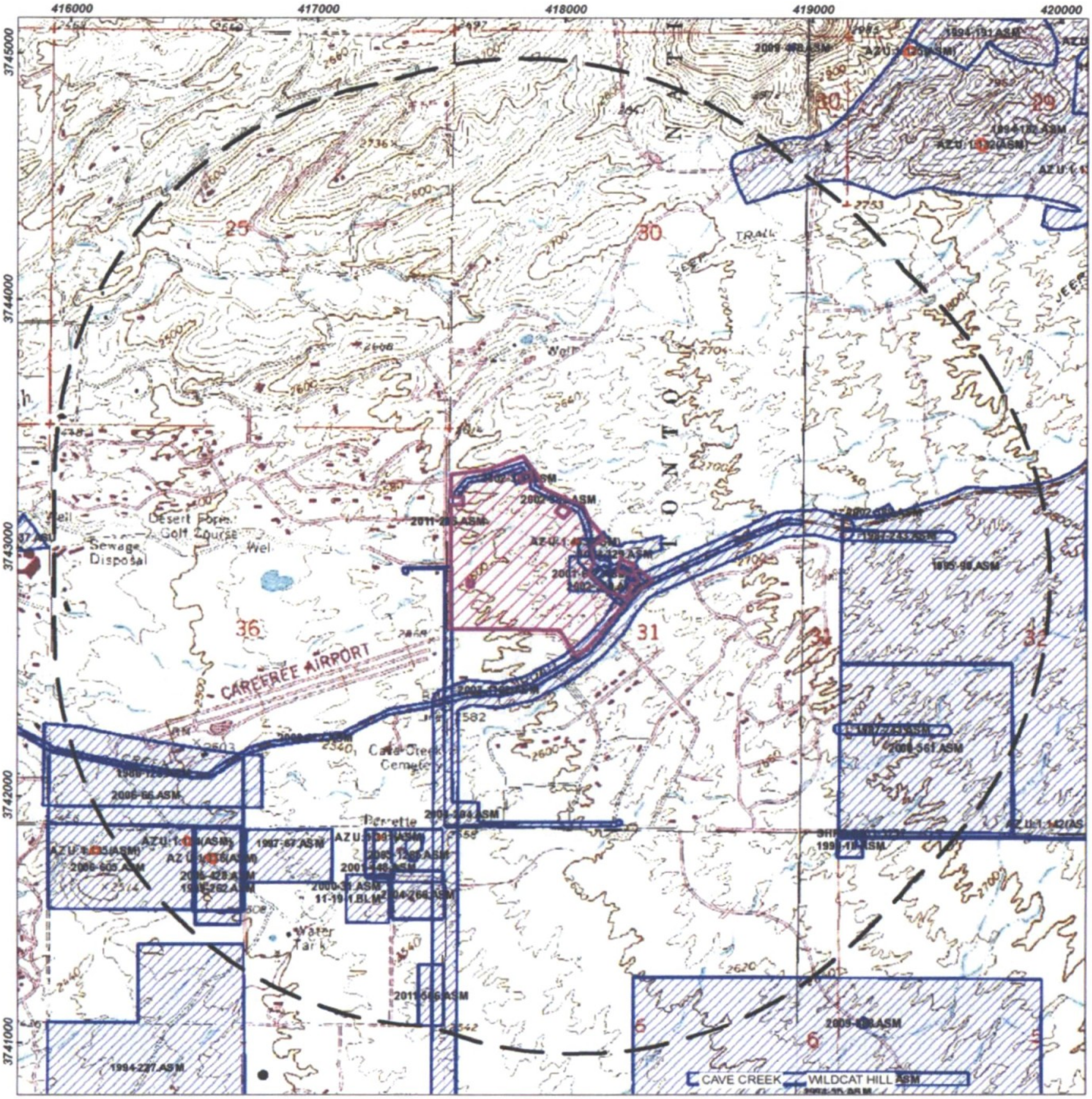
Appendices
Confidential Information

Appendix A.
Previous Research Maps



Source: USGS 7.5' Quadrangles:
Cave Creek, Ariz. (1965, 1981);
Wildcat Hill, Ariz. (1965, 1981)
NAD 1983, UTM Zone 12

Key

Survey area

Study area

0 2000 ft

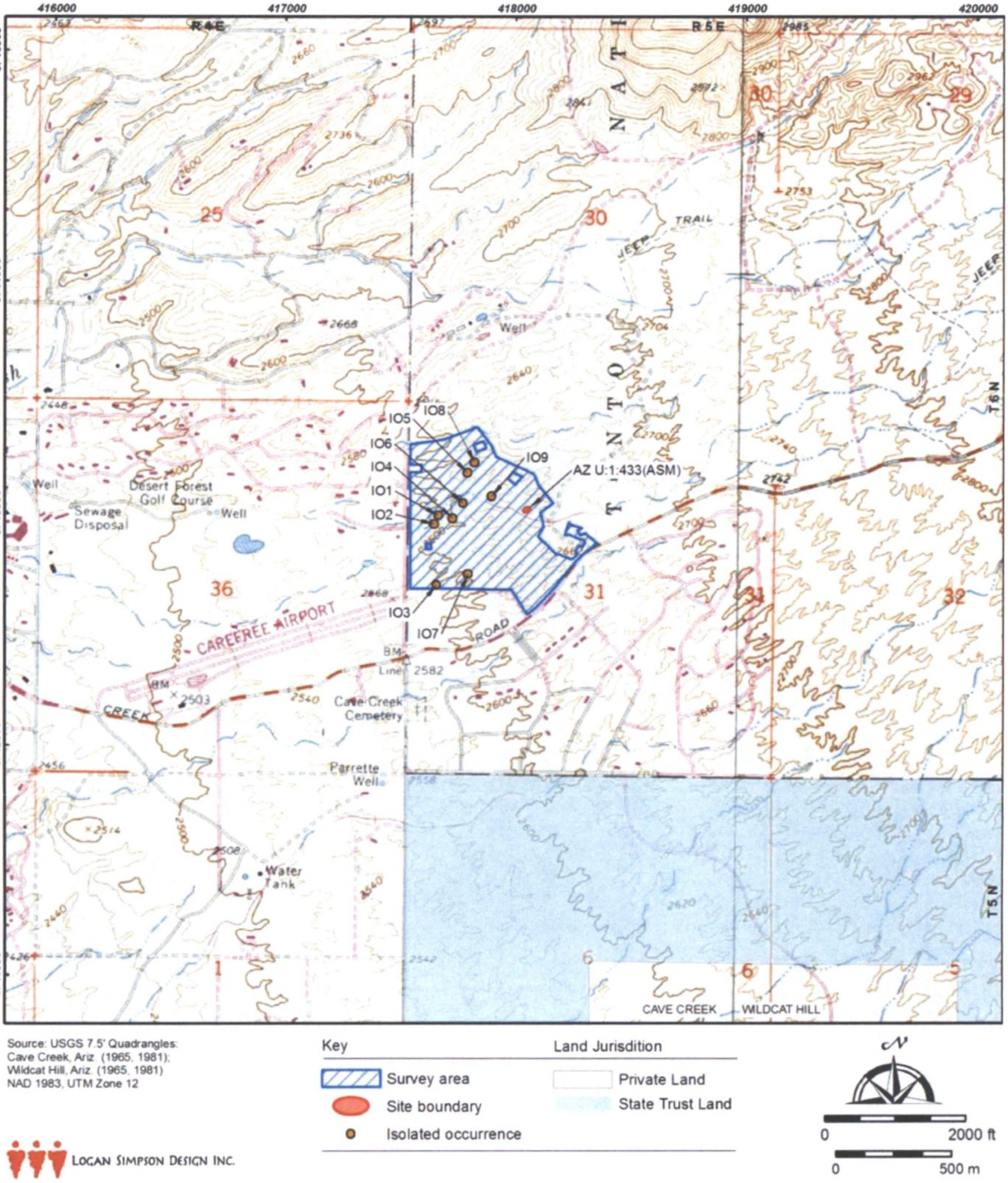
0 500 m

LOGAN SIMPSON DESIGN INC.

Appendix A.1 Location of previous recorded sites and projects within the project vicinity.

Appendix A.2. Location of survey area and previously recorded archaeological site.

APPENDIX B.
LOCATION OF CULTURAL RESOURCES



Appendix B.1. Location of cultural resources.

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PRELIMINARY DRAINAGE REPORT
FOR
DESERT MOUNTAIN PARCEL 19

June 16, 2016
WP# 164434

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Registered Professional Engineer (Civil)
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EXP. 3-31-2018

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TABLE OF CONTENTS

Registered Professional Engineer (Civil)
CERTIFICATE NO. 34573
JOSEPH C. DACONTA
Date Signed 6-14-16
ARIZONA, U.S.A.

EXP. 3-31-2018

APPENDICES

Appendix A — Existing Condition Hydrologic Calculations
- DDMSW Output Data
- 2-year HEC-1 Model
- 10-year HEC-1 Model
- 100-year HEC-1 Model

Appendix B — Developed Condition Hydrologic Calculations
- DDMSW Output Data
- 2-year HEC-1 Model
- 10-year HEC-1 Model
- 100-year HEC-1 Model

Appendix C — Site Retention Calculations
- Required First Flush Storm Water Calculations
- Provided Storm Water Calculations

Appendix D — Hydraulic Calculations
- HEC-RAS Output Files Existing & Proposed Conditions
- Scour Calculations
- Erosion Hazard Setback Calculations

Appendix E — Electronic Files: PDF of Report
DDMSW DM 19 Existing & Proposed ZIP files,
Existing & Proposed 2-year, 10-year & 100-year HEC-1 Files
Existing Wash A & Existing & Proposed Galloway Wash HEC-RAS Files

EXHIBITS

Exhibit 1	Vicinity Map
Exhibit 2	ESL Classification Map
Exhibit 3	Flood Insurance Rate Map (FIRM)
Exhibit 4	Soils Classification Map
Exhibit 5	Aerial Map
Exhibit 6	Developed Conditions Land Use Map
Exhibit 7	Existing Conditions Sub-Basin HEC-1 Map
Exhibit 8	Developed Conditions Sub-Basin HEC-1 Map
Exhibit 9	Existing Conditions Hydraulics Map
Exhibit 10	Developed Conditions Hydraulics Map
Exhibit 11	Preliminary Grading Plan

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EXP. 3-31-2018

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1.0 INTRODUCTION

1.1 Project Description

Desert Mountain Parcel 19 (DM 19), herein referred to as the "Site," is an approximate 92-acre parcel of land located in north Scottsdale and is proposed to be rezoned to R4 zoning and OS (Open Space). The Site is located in Section 31, Township 6 North, Range 5 East, of the Gila and Salt River Base and Meridian. The Site is currently an undeveloped parcel, bound to the west by Pima Road and the Carefree Fore More Development (located within the Town of Carefree), to the east by the Desert Mountain Club Golf Course, to the north by the Gambel Quail Preserve 2 Development (both located in the City of Scottsdale), and to the south and southeast by the Velvet Shadows 3 Development and two churches (Christ the Lord Lutheran Church and Our Lady of Joy Roman Catholic Church; all within the Town of Carefree). The Site was originally part of the Desert Mountain Master Development Plan. Exhibit 1 – *Vicinity Map* shows the general location of the project and surrounding areas.

1.2 Type of Report

This Report is being prepared as a Preliminary Drainage Report for the DM 19 rezoning submittal to the City of Scottsdale. At this time, only preliminary grading, roadways and a general land use plan has been completed for the Site.

1.3 Purpose

The Preliminary Drainage Report for DM 19 has been prepared to meet the drainage design requirements outlined in Chapter 4 of the *City of Scottsdale Design Standards and Policies Manual* (*DS&PM*), the *Flood Control District of Maricopa County* (FCDMC), *Drainage Design Manual for Maricopa County, Arizona: Volume I – Hydrology*, and the *Flood Control District of Maricopa County*, *Drainage Design Manual for Maricopa County, Arizona: Volume II – Hydraulics*. This report presents the results of the hydrological and hydraulic modeling of the Site's proposed preliminary drainage systems.

The main purpose of this Report is to illustrate the following:

- Compliance with the City of Scottsdale's Floodplain Ordinance stormwater storage requirements for the property subject to the Environmentally Sensitive Land Ordinance (ESLO). The Site will provide the first flush stormwater storage for the first 0.5-inch of runoff and/or first flush treatment for the property's improved areas. A Request for a Stormwater Storage Waiver is anticipated to be submitted to the City of Scottsdale.

- Reduction of post-development flows to at or below the pre-development flows for 2-year, 10-year, and 100-year, 6-hour storm events using the *U.S. Army Corps of Engineers, HEC-1, Flood Hydrograph Package*. Hence, it is anticipated that the downstream properties shall be provided with similar or potentially better flood protection than the pre-development conditions.

- Maintaining the two main water courses traversing through the Site in their natural locations (the Galloway Wash and Wash A).

- Delineation of the 100-year water surface inundation extents, along with determination of the 100-year water surface elevations for the two main drainage courses using the *U.S. Army Corps of Engineers, HEC-RAS* (Version 4.1.0).

- Delineation of the 100-year water surface inundation extents for all washes determined to have peak flows equal to or greater than 50 cfs using hydraulic analysis software such as AutoCad Civil 3D *Hydroflow* (Version 10.5).

- Hydraulic analyses of preliminary drainage structures and wash conveyance corridors.

2.0 EXISTING ON-SITE DRAINAGE CONDITIONS AND CHARACTERISTICS

2.1 On-Site Drainage

The Site lies in the northern planning section of the City of Scottsdale. The elevations range from 2,612 in the middle of the Site, to 2,650 feet in the east and 2,587 feet in the west. Based on the existing topography, the Site drains primarily from east to west with an approximate average slope of 2%. There are two primary outflow concentration points, one located at the northwest corner and one at the center of the western property boundary. There are several additional minor outflow concentration points along the southern and western property boundary.

Vegetation is typical Sonoran Desert type with creosote bush, jumping cholla, saguaro cacti, palo verde, ironwood, and mesquite trees. The Site lies within the areas identified as Environmentally Sensitive Lands (ESL) by the City of Scottsdale. The Site is further classified as 'Upper Desert' within the ESL areas as shown on Exhibit 2 – *ESL Classification Map.*

The USDA Natural Resources Conservation Service (NRCS), formerly known as the Soil Conservation Service (SCS), provides soils data for all of Maricopa County. This data is reproduced on Exhibit 4 – *Soils Classification Map*. Soils data is the basis of the rainfall loss parameters, as discussed in Section 5.2.3.

There is one wash, the Galloway Wash, that traverses the Site and is categorized as a 'Vista Corridor' or 'Major Wash', as the calculated 100-year, 6-hour flow is greater than 750 cfs. There is also one other significant watercourse traversing the Site that has a 100-year, 6-hour flow greater than 400 cfs and is referred to as "Wash A". The Galloway Wash and Wash A are identified on Exhibit 9 – *Existing Conditions Hydraulics Map.* Wash A was determined to have a 100-year flow of approximately 470 cfs. Both washes will be maintained in their natural locations and will not be re-aligned.

2.2 Existing On-Site Drainage Network

Existing on-site drainage sub-basin boundaries were identified using aerial mapped 1-foot contours; refer to Exhibit 7 – *Existing Conditions Sub-Basin HEC-1 Map.*

The on-site watersheds primarily drain east to west or southwest with only one wash exiting the property along the southern boundary with a 100-year peak flow greater than 50 cfs. This wash appears to enter the Velvet Shadows 3 Development and continues west combining with some additional runoff from the Site before flowing through the Our Lady of Joy Roman Catholic Parish Carefree church parking lot and ultimately over Pima Road by an at-grade drainage crossing. The flow exiting the Site has an estimated existing 100-year peak flow of 65 cfs.

Based on the results of the wash hydraulic analysis, a delineation of this wash's existing condition 100-year, 6-hour floodplain limits has been illustrated on Exhibit 9 – *Existing Conditions Hydraulic Map.* Pre-development sub-critical flow water surface elevations for each cross-section are included on Exhibit 9. The hydrologic and hydraulic analysis procedures are discussed in Section 5.0. It is anticipated that this wash will be modified and an Application for Wash Modification will be submitted to the City of Scottsdale.

2.3 Off-Site Watersheds

The off-site drainage areas impacting the Site lay to the east and are in the northern planning section of the City of Scottsdale. The off-site watersheds contain primarily large rural lot single family residential subdivisions and are part of the Desert Mountain Master Development Plan community. These drainage areas are identified on Exhibit 7. The off-site areas are also classified as 'Upper Desert' ESL landform areas by the City of Scottsdale.

2.4 Existing Off-Site Drainage Network

The *Floodplain Delineation Study of Andora Hills & Galloway Washes Technical Data Notebook* (TDN), the *Master Drainage Report for Desert Mountain Parcel C* Offsite Drainage Map, the *Master Drainage Report for Desert Mountain Development* Master Development Plan exhibit and the City of Scottsdale 2-foot contour interval topographic Quarter Section Maps were used to identify and confirm the off-site drainage areas impacting the Site. Refer to Exhibit 7 for the limits of the drainage areas and concentration points.

Off-site flows from the east enter the Site's eastern property boundary at five locations. Four of the concentration points are washes with 100-year peak discharges greater than

50 cfs and one location has a discharge of only 3 cfs. Starting at the northeast property boundary and continuing south, the washes' approximate 100-year peak flows were determined to be: Wash A's flow is 468 cfs, two unnamed washes' flows are 72 cfs and 111 cfs, and the Galloway Wash is 1,111 cfs.

Based on the results of the HEC-RAS and hydraulic wash analyses, a delineation of the existing condition 100-year, 6-hour floodplain limits for the Galloway Wash, Wash A and the two unnamed washes have been illustrated on Exhibit 9 – *Exist Condition Hydraulics Map.* Pre-development subcritical flow water surface elevations for each cross-section are included on Exhibit 9. The hydrologic and hydraulic analysis procedures are discussed in Section 5.0.

2.5 Existing Drainage Relative to Adjacent Projects

Existing washes exit the Site as concentrated flows at various locations along the western and southern property boundary. As Wash A exits the Site it immediately combines with additional flow from the north and is conveyed over Pima Road by an at-grade drainage crossing. The Galloway Wash also is conveyed over Pima Road by an at-grade drainage crossing and the preliminary hydraulic results determined that the depth of flow over Pima Road is greater than one foot. As detailed within the *Floodplain Delineation Study of Andora Hills & Galloway Washes* TDN, when the flow leaves Pima Road it splits around the existing single-family residence before recombining downstream and continuing to the west.

There are an additional six concentrated flow exit locations along the western property boundary and three concentrated flow exit locations along the southern property boundary. These 100-year peak flows vary from a maximum discharge of 67 cfs to only 4 cfs. Refer to Exhibit 7 for the exiting concentration point locations.

There is also a small piece of the Site that is not within the City of Scottsdale and is located at the southeast corner of the property. This portion of the Site is located within the Town of Carefree and also has two existing concentration points that exit the Site to the west.

2.6 FEMA Regulated Flood Zones

The Site is located within the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas, Panel Number 04013C0884L, effective date October 16, 2013. The FIRM, published by the Federal Emergency Management Agency (FEMA), indicates that the Site is located within Special Flood Hazard Areas (SFHAs) Zone AE, Other Flood Areas Zone "X" (Shaded) and Other Areas Zone "X".

Zone "X" is defined by FEMA as follows:

> *"Areas determined to be outside 500-year floodplain."*

Zone "X (Shaded)" is defined by FEMA as follows:

> *"Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance floods."*

Special Flood Hazard Areas (SFHAs) Subject To Inundation By the 1% Annual Chance Flood is defined as follows:

> *"The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Aras is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.*

Zone "AE" is defined as: *"Base Flood Elevations determined".*

The approximate location of the Site relative to the FEMA FIRM panel is illustrated on Exhibit 3- *Flood Insurance Rate Map (FIRM).*

The proposed Site's development will not alter the effective FEMA SFHA floodplain and/or floodway and will not change the effective FEMA SFHA base flood elevations. This will be documented in more detail as the Site progresses into the pre-plat phase of development.

3.0 PROPOSED DRAINAGE PLAN

3.1 General Description of Proposed Drainage System

The Site is being rezoned to approximately 44-acres of R4 zoning and approximately 48-acres of Open Space zoning. Preliminary site grading is shown on Exhibit 11 – *Preliminary Grading Plan.* The proposed drainage system is being designed to allow existing drainage patterns to be maintained in their natural location and condition where possible. Where the proposed development will disturb existing washes with 100-year peak discharges equal to or greater than 50 cfs, the washes will be modified to re-direct flow around and/or through the development to maintain historical flow patterns.

The off-site flow of the Galloway Wash will be conveyed through the Site with as little disturbance to the natural wash corridor as possible. The Galloway Wash will have two proposed 3-barrel, 10-foot wide by 4-foot high box culvert roadway drainage crossings to pass the 100-year discharge under the streets. One crossing is located near the eastern property boundary and one crossing is located within the middle of the Site. There is no anticipated disturbance to the Galloway Wash natural wash bottom between these proposed drainage crossings. Downstream of the middle box culvert roadway crossing to approximately 200-feet upstream of the western property boundary, the Galloway Wash will have a relatively small pilot channel (20-foot wide by 1-foot deep) to offset some potential open space encroachment grading proposed within the existing FEMA SHFA. Any grading proposed within the existing FEMA 100-year floodplain will require an FCDMC floodplain use permit.

The off-site flow of Wash A will be conveyed through the Site. The post-development design is not anticipated to disturb the existing natural wash corridor. In addition, any post-development adjacent to the wash is being designed to drain away from Wash A. Therefore, there is no foreseen modification to the wash and/or change to the existing 100-year peak flow of Wash A due to development.

3.2 Future Conditions

Currently, the upstream off-site watersheds located within Desert Mountain have been fully developed. The Desert Mountain development land uses were obtained from the

Floodplain Delineation Study of Andora Hills & Galloway Washes TDN and were duplicated in the HEC-1 hydrologic models.

The drainage plan for the Site proposes to maintain the 2-year, 10-year, and 100-year, 6-hour storm event post-development peak discharges at or below the pre-development flows. In addition, the two significant drainage courses, Wash A and the Galloway Wash, will be maintained in their historic locations at the property boundary. No adverse impact is anticipated on the adjacent properties downstream of the project Site for the 2-year, 10-year, and 100-year, 6-hour storm events.

3.3 Stormwater Storage Requirements

According to the City of Scottsdale's Floodplain Ordinance for property located within the ESL, all runoff generated from the developed portion of the Site must be managed, and the peak discharges from the Site reduced to at least pre-development values during the 100-year, 10-year and 2-year storm frequencies. Proposed retention and/or detention basins will be strategically located along several exiting flow locations and along the Galloway Wash which will attenuate the post-development peak discharges to at or below the pre-development values. Stormwater storage basins will also be designed to intercept flow from upstream proposed developed areas to retain the post-development required first flush retention volume and/or flow will be treated prior to exiting into the adjacent washes. 18-inch bleed-off pipes with removable 6-inch orifice plates are proposed for the dissipation of the retained storm water.

Table 3.3 below summarizes the required first flush stormwater storage for the Site and Exhibit 8 and Exhibit 11 detail the on-site drainage areas and preliminary first flush basin locations, respectively.

Table 3.3
Required First Flush Stormwater Storage

Drainage Area	Area (SF)	Area (ac)	Weighted Runoff Coefficient	First Flush Volume (ac-ft)	Required Pre vs Post Volume (ac-ft)
B5	165024	3.79	1.00	0.16	0.42
B6	239591	5.50	1.00	0.23	N/A
B8	300366	6.90	1.00	0.29	N/A
B9	217378	4.99	1.00	0.21	N/A
B10	335363	7.70	1.00	0.32	N/A
B11	269364	6.18	1.00	0.26	N/A
B13	80916	1.86	1.00	0.08	N/A
B14	1072718	24.63	1.00	1.03	N/A
B14A	115650	2.65	1.00	0.11	N/A
C1	636403	14.61	1.00	0.61	N/A

3.4 Pre- and Post-Runoff Characteristics

The U.S. Army Corps of Engineers' HEC-1 computer analysis program was used for hydrologic modeling, including routing of flow through storage basins and combining hydrographs. The HEC-1 model was also used to compare the pre- and post-development runoff at concentration points exiting the property. Runoff for each drainage sub-basin was computed and if required, hydrographs were then combined. Drainage basins were further divided into sub-basins to simulate the developed conditions. The parameters were selected per the guidelines provided in the *DS&PM*. The parameters selected and the inputs for the HEC-1 models are discussed in Section 5.1.

The HEC-1 input data and output files for the existing conditions are included in Appendix A. The developed conditions data is included in Appendix B. The data analysis procedures are discussed in Section 5.0.

Table 3.4-1 below provides the comparative peak flows for the pre- vs. post-developed conditions for 100-year, 10-year, and 2-year, 6-hour events at concentration point where flow leaves the property. For the location of these concentration points and corresponding 100-year, 6-hour flow values, refer to Exhibit 7 and Exhibit 8.

Table 3.4-1
Pre – vs. Post-Peak Flow Analysis

HEC-1 ID PRE/POST	100-yr, 6-hr Existing Condition Peak Flow (cfs)	100-yr, 6-hr Post-Dev. Condition Peak Flow (cfs)	100-yr, 6-hr Difference in Peak Flow (cfs)	10-yr, 6-hr Existing Condition Peak Flow (cfs)	10-yr, 6-hr Post-Dev. Condition Peak Flow (cfs)	10-yr, 6-hr Difference in Peak Flow (cfs)	2-yr, 6-hr Existing Condition Peak Flow (cfs)	2-yr, 6-hr Post-Dev. Condition Peak Flow (cfs)	2-yr, 6-hr Difference in Peak Flow (cfs)
CP-A2/CP-A2	469	467	2	261	260	1	128	128	0
B1/DVB11	35	30	5	19	15	4	8	0	8
C1/DTC11	26	5	21	14	5	9	6	5	1
CP-E5/CPGAL	1124	1025	99	549	527	22	230	222	8
F1/DTGF	4	3	1	2	1	1	1	1	0
G1/DTC-H	23	15	8	13	8	5	6	0	6
H1/DV-B5	17	17	0	10	0	10	5	0	5
I1	20			11			5		
J1	10			6			3		
K1	65			36	29		17		
I1,J1,K1/DTC-K	95	50	45	53	18	35	25	1	24
L1	10	10	0	6	6	0	3	3	0
M1	3	3	0	2	2	0	1	1	0

3.5 Proposed Drainage Structures

3.5.1 On-site First Flush Storage Basins

On-site first flush storage basins will be used to capture the first 0.5-inch of runoff from the post-development disturbed areas. The design of the basins will be at a maximum depth of 3-feet and have 4:1 side slopes. 18-inch bleed-off pipes with 6-inch orifice plates will be used to drain the stormwater storage within a 36-hour period. Outlet weirs will be incorporated into the basin design for overflow conveyance. When the capacity of the basin is reached, the runoff will overtop the weir and be released at historic flow locations. Erosion protection will be incorporated within the design of the outlets.

3.5.2 Off-Site & On-Site Galloway Wash Detention Basins

As detailed on Exhibit 8, there are two off-site off-line detention basins (Basin 3 and Basin 4) and one on-site off-line detention basin (Basin 1) proposed along the Galloway Wash. The two off-site off-line detention basins will require improved wash channel sections and erosion protected weir inlets to remove a portion of the 100-year peak flow from the wash. The runoff will enter the detention basin and pond a maximum depth of 4-feet during the 100-year event and have a minimum of an 18-inch outflow pipe that will drain the basin within a few hours. The proposed detention basins will have storage volume capacities of approximately 2.0 acre-feet (Basin 3) and 1.4 acre-feet (Basin 4). Contractual agreements are being prepared with the upstream land owners to allow for the construction and maintenance of these off-line detention basins.

One on-site off-line detention basin will be located downstream of the Galloway Wash middle box culvert crossing and will receive flow from an 18-inch pipe located upstream of the roadway crossing. This detention basin will collect some of the low-flow stormwater runoff to reduce the 2-year and 10-year peak flow of the Galloway Wash. There will be a weir outlet from the detention basin that will drain excess flow back into the Galloway Wash. The proposed detention basin will have approximately 1.1 acre-feet of storage volume at a maximum ponding depth of 4-feet during the 100-year runoff event. The bottom 1-foot will be used for on-site first flush storage. The basin will have an 18-inch outflow pipe with a 6-inch orifice plate that will also drain back into the Galloway Wash. It is anticipated that the basin will drain within a few hours.

The three off-line detention basins were included in the post-development HEC-1 model. The hydrology results can be found within Appendix B.

In several critical locations along the wash, bank protection is necessary to protect proposed off-line detention basins. The bank protection is planned to be aesthetically pleasing and may be either integrally colored soil cement and/or reinforced gunnite/concrete, seated grouted rock riprap and/or gabion baskets/mattresses. Bank protection will be designed to extend to a maximum calculated scour depth of 4-5 feet below the wash bottom. Refer to Exhibit 10 for bank protection locations and Appendix E for scour depth calculations.

3.5.3 Roadway Crossing Structures

There are currently two proposed on-site roadway drainage crossing structures that have been designed to convey the anticipated post-development 100-year flow of the Galloway Wash. The flows were calculated at the box culvert locations using the results of the post-development HEC-1 model analysis. Refer to Appendix B for the flow calculations.

Both crossing locations will be designed with a 3-barrel, 10-foot wide by 4-foot high box culvert roadway drainage crossing. The roadway crossings were analyzed within the wash's hydraulic analysis using the U.S. Army Corps of Engineers *HEC-RAS (Version 4.1.0),* such that the estimated upstream 100-year peak flow is contained within the wash and no overtopping of the roadway is anticipated. The box culverts will be designed with drop inlets and a longitudinal slope such that sediment deposition is not anticipated within the culverts.

Riprap and/or erosion protection will be designed at the inlets and outlets of the box culverts to control velocities and prevent erosion. In several critical locations along the wash, bank protection is necessary to protect the proposed roadway improvements. The bank protection shall extend to a maximum calculated scour depth of 4-5 feet below the wash bottom. Refer to Exhibit 10 for bank protection locations and Appendix E for scour depth calculations.

Although the land use is still in a preliminary stage, there are additional locations within the Site that are anticipated to require culverts to pass the flow under roadways and/or to convey flow from the eastern property boundary to the Galloway Wash. These culverts will be designed using AutoCad Civil 3D *Hydroflow* (Version 10.5), Bentley's *CulvertMaster*® *v3.1*, Copyright© 1995-2007, and/or the Federal Highway Administration HY-8 v7.3, 2013 program to determine the pipe sizes, headwater elevations and pipe velocities.

3.5.4 On-site Roadway Drainage Structures

3.5.4.1 Street Flow

The Rational Method will be used to calculate the storm water runoff generated from the roadways and any on-site adjacent developments that drain into the residential roadways. The 100-year and 10-year flow will be calculated for the street flow based on the FCDMC Rational Method, as discussed in Section 5.1.3.

3.5.4.2 Street Capacity Hydraulics

There are no anticipated arterial, major and/or minor collector roadways proposed within the development. For all local interior streets, the street conveyance capacity will be calculated using Manning's Equation. The streets will be designed such that the 10-year peak flow is contained within the street curbs and the 100-year peak flow does not exceed a maximum depth of 8-inches. A Manning's "n" value of 0.015 will be used for the standard street cross-section. Roadway capacities will be calculated based on 4-inch and/or 6-inch roll curb (where necessary). The drainage for local residential roadways will be designed consistent with the City of Scottsdale Ordinance 37-42(4) for the allowable depth of water on the street when the street is being utilized as a water carrier. The methodology developed by the Federal Highway Administration will be used to calculate, in spreadsheet format, the allowable street cross-section capacities.

3.5.4.3 Curb Openings

Catch basins, scuppers and/or depressed curb openings will be designed to convey runoff from the streets such that street flow depths do not exceed 8-inches for the 100-year flow, and the 10-year flow is contained within the curbs. On-site storm water runoff generated by the residential roadways is planned to exit the street via on-grade and/or low point sump curb openings. Flow will then be directed within storm drain, roadside drainage swales and/or along natural grade to the closest receiving wash, retention basin, and/or culvert inlet. All scupper and catch basin curb openings will be designed to include a 0.80 reduction factor.

4.0 SPECIAL CONDITIONS

4.1 Section 404 Washes

To the best of our knowledge, the US Army Corps of Engineers (Corps) Section 404 of the Clean Water Act (CWA) Jurisdictional Waters of the United States has not yet been determined within the Site. Potential CWA Section 404 Jurisdictional Washes are under investigation and an approved jurisdictional determination submittal inclusive of a significant nexus analysis is being prepared for the Site by Del Sol Group to identify if any of the washes may be deemed jurisdictional. It is understood that an approved jurisdictional delineation of the Waters of the United States is required for the Site.

5.0 DATA ANALYSIS METHODS

5.1 Hydrologic Method Description

This section documents the engineering procedures and methodologies used to generate the existing and developed condition hydrologic models for the Site. The results of the hydrologic models were used in the conceptual design of drainage facilities and to assure compliance with current drainage design standards.

Precipitation was input by use of the FCDMC 6-hour local storm. Key rainfall statistics were obtained from the *NOAA Atlas 14*, Arizona. The FCDMC DDMSW program was used to develop the necessary point rainfall depth-duration-frequency statistics. Table 5.1 below provides a summary of the point rainfall depth-duration-frequency data. Rainfall losses were calculated by use of the Green and Ampt infiltration equation with an allowance for surface retention loss. Synthetic unit hydrographs for each sub-basin were developed using the Phoenix Desert/Rangeland unit hydrograph as was used within the approved *Floodplain Delineation Study of Andora Hills & Galloway Washes* TDN. Existing and proposed discharges for the 100-year, 10-year and 2-year, 6-hour storm events were modeled using HEC-1 at various concentration points as shown on Exhibit 7 and Exhibit 8, respectively. The HEC-1 results are provided within Appendix A and Appendix B for the existing and proposed condition watersheds, respectively.

Table 5.1

Point Rainfall Depth-Duration-Frequency Data

Frequency→	2-year	5-year	10-year	25-year	50-year	100-year
Duration↓	Rainfall (in)					
5 min	0.33	0.44	0.53	0.64	0.73	0.82
10 min	0.50	0.67	0.80	0.98	1.11	1.24
15 min	0.62	0.83	1.00	1.21	1.37	1.54
30 min	0.83	1.12	1.34	1.63	1.85	2.07
1 hour	1.03	1.39	1.66	2.02	2.29	2.56
2 hour	1.19	1.57	1.87	2.27	2.58	2.90
3 hour	1.26	1.64	1.94	2.36	2.70	3.04
6 hour	1.48	1.87	2.18	2.62	2.96	3.31
12 hour	1.78	2.23	2.59	3.08	3.45	3.84
24 hour	2.08	2.73	3.27	4.02	4.65	5.32

5.2 Parameter Estimation

The physical parameters of the sub-basins modeled by HEC-1 were estimated by the procedures in the *FCDMC Hydrology Manual*. The information and procedures used to estimate the aforementioned parameters are contained in the following sections. Parameter values are summarized for each sub-basin within the *FCDMC Drainage Design Management System for Windows* (DDMSW) software output located in Appendices A and Appendix B, for the existing and proposed conditions, respectively.

5.2.1 Drainage Area

For the existing conditions, the sub-basin drainage areas were determined for use in the HEC-1 model and are shown on Exhibit 7. For the proposed condition, the sub-basin drainage areas were determined for use in the HEC-1 model and are shown on Exhibit 8.

5.2.2 Precipitation

Due to the approximate one square mile size of the largest contributing watershed of the Galloway Wash, the 100-year, 6-hour storm frequency was used for the hydrology analysis. Rainfall distributions based on watershed area are furnished by the FCDMC. The contributing watershed area and corresponding precipitation pattern were determined and input into the HEC-1 model using the JD and PC record option.

Point precipitation values used in this study were derived from the isopluvial maps in the *FCDMC Hydrology Manual* which, in turn, were derived from the *NOAA Atlas XIV, Volume III*. The 100-year, 6-hour point rainfall depth used for the Site is 3.31 inches.

5.2.3 Soil Data

A description of the soils in the watershed is contained within the *NRCS Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona*. Based on the NRCS surveys, the Site's watersheds lie mainly within several soil map units: Unit 93, 96, 34 and for the Galloway Wash Unit 6, with the upstream watersheds consisting of primarily Unit 33. According to the soil survey, the soil surface is primarily gravely clay and sandy loam. Exhibit 4 – *Soils Classification Map* depicts the contributing watersheds and soil designations.

5.2.4 Rainfall Losses

Rainfall losses were estimated using the Green and Ampt infiltration equation. The procedures used are described in the following paragraphs and were utilized for both existing and proposed condition HEC-1 modeling.

The composite (unadjusted) XKSAT parameter was calculated in the *FCDMC DDMSW* program using the log-average method for each sub-basin. This was accomplished by multiplying the total area of each soil map unit in the sub-basin by the common logarithm of the associated XKSAT value. The resultant products were then totaled and the sum was divided by the total area of the sub-basin. The result is the composite log-average bare ground XKSAT parameter. The log-average XKSAT parameter was then adjusted for the effects of vegetation cover using data from Figure 4.4 of the *FCDMC Hydrology Manual.* The volumetric soil moisture deficit at the start of rainfall (DTHETA) and wetting front capillary suction (PSIF) parameters are directly related to the composite bare ground hydraulic conductivity (XKSAT) by Figure 4.3 in the *FCDMC Hydrology Manual*.

The DTHETA parameters were read from lookup tables within the DDMSW program using the unadjusted XKSAT value calculated as described above. Two (2) DTHETA conditions are possible, dry and normal. The "dry" condition was used for all areas in the existing condition model for undeveloped desert areas. The "normal" condition was used for all other land uses occurring within the project watershed for the proposed condition model. DTHETA values were read from the lookup tables corresponding to the unadjusted XKSAT value, and were averaged by land use area-weighting within the DDMSW program. The value of PSIF was also read from lookup tables based on the unadjusted XKSAT value.

Initial abstraction (IA) and percent impervious (RTIMP) values correlate to soil types and land use. The following section further discusses the hydrologic significance of the IA and RTIMP parameters.

5.2.5 Land Use Characteristics

Land use characteristics upstream of the study area were obtained from the *Floodplain Delineation Study of Andora Hills & Galloway Washes* TDN and were verified from aerial photographs. Surface characteristics affecting the hydrology include terrain (land use classification), the proportion of impervious surfaces, and vegetative cover density. *DDMSW* values for initial abstraction (IA), percent impervious (RTIMP) were obtained from the FCDMC Hydrology Manual. The *Floodplain Delineation Study of Andora Hills & Galloway Washes* TDN was used to estimate the hydraulic efficiency (Kn) for the *Rural Density Residential* land use parameters. Assigned values for all parameters are shown in Appendices A and Appendix B for existing and proposed land use conditions, respectively.

5.2.6 Unit Hydrographs

To be consistent with the approved *Floodplain Delineation Study of Andora Hills & Galloway Washes* TDN, the *FCDMC Hydrology Manual* Phoenix Desert/ Rangeland unit hydrograph was used for watersheds upstream of the project Site and for the undeveloped on-site areas. The Phoenix Valley S-graph unit hydrograph was used for the post-development on-site conditions. Separate unit hydrographs are generated for each sub-basin by the use of the DDMSW program. This program calculates the basin lag time. Assigned values for all parameters are shown within the printouts of the FCDMC DDMSW located within Appendix A and Appendix B for the existing and proposed conditions, respectively.

5.2.7 Computation Time Interval

The computation time interval (NMIN) used in the HEC-1 models was based on guidelines in the *FCDMC Hydrology Manual,* which recommends an NMIN value of 0.15 *Tc. Due to the small post-development on-site watershed areas, a minimum NMIN value of 1 minute was used and a 15-minute hydrograph time interval was used for the entire study area. For comparison purposes, a 1-minute NMIN value and a 15-minute hydrograph time interval was also used for the existing condition model.

5.2.8 Routing Parameters

Routing of sub-basin hydrographs in the study area will be performed utilizing the normal depth/storage channel routing option of HEC-1.

5.2 Rational Method

The Rational Method will be used to compute peak discharges to size on-site culverts with watersheds less than or equal to 160 acres. Parameters necessary for this procedure are the measurement of drainage sub-basin areas, runoff coefficient ("C" values), and calculation of rainfall intensity. Runoff coefficients will be calculated using the values based on Figure 4-5 "Runoff Coefficients for Use with Rational Method" in the *DS&PM.*

5.3 Storm Water Storage

Based on the City of Scottsdale's Drainage Ordinance stormwater storage requirements, on-site first flush storm water storage is proposed to be provided for the first 0.5-inch of runoff. The Rational Method is used to estimate the first flush stormwater storage volumes. The required volume is based on the areas of the proposed disturbances within the development. The equations used to calculate the required and provided retention volumes are presented below.

5.3.1 Required Retention Volume

Retention volume required for the 100-year, 2-hour event is:

$$V_{REQUIRED} = C*\left(\frac{P}{12}\right)*A$$

Where:

- V is the required retention volume in acre-feet.
- C is the weighted "C" coefficient.
- P is the precipitation in inches for the 100-year, 2-hour rainfall; 2.70- inches for the proposed developed areas.
- A is the drainage area in acres.

5.3.2 Provided Retention Volume

Retention volume provided for the 100-year, 2-hour event is:

$$V_{PROVIDED} = \left[\left(\frac{A_1 + A_2}{2}\right)*(ELEV_2 - ELEV_1)\right]$$

Where:

- V is the provided retention volume in acre-feet.
- A is the contour area in acres.
- ELEV is the contour elevation.

Section 3.3 of this Report describes the preliminary storm water storage proposed basin locations. Assumptions that were made when determining provided volume were maximum side slopes of 4:1. Refer to stormwater storage basin volume calculations in Appendix C.

5.4 Hydraulic Procedures

5.4.1 Hydraulic Analysis of Open Channels

Due to the fact that the Galloway Wash and Wash A have significant 100-year peak flows, the U.S. Army Corps of Engineers' HEC-RAS computer program was used for the hydraulic analysis of both washes. Washes that were determined to be less than a 100-year peak flow of 150 cfs will use hydraulic analysis software such as AutoCad Civil 3D *Hydroflow* (Version 10.5) to determine their existing wash hydraulic conditions.

5.4.2 HEC-RAS Errors, Warnings, and Notes

The HEC-RAS cross sections were placed such that significant variations in the channel cross-sectional geometry are adequately represented. Due to the relatively steep slopes on the Site, it was not feasible to put enough cross-sections such that the difference in energy grade elevations is less than 1-foot between cross sections. The HEC-RAS computer program gives a warning message for a difference in energy grade elevation of greater than 1-foot between cross sections. Hence, a wash was analyzed at an elevation difference of 1-foot to demonstrate the impact of additional cross sections on the HEC-RAS analysis. It was found that increasing the number of cross-sections did not impact the flow depths, as long as adequate cross-sections representative of the geometry of the channel are included.

HEC-RAS gives multiple warning messages when the energy equation could not be balanced, resulting in the program using the critical depth for the water surface elevation. This is due to the fact that a sub-critical flow regime was selected for the steady flow computations on a site that is relatively steep. The on-site washes are flowing super-critical, but a sub-critical flow regime was chosen because it results in the highest water surface elevations.

Since the proposed culverts generally follow the same slope as the washes, the flow in the culverts is also flowing super-critical, as noted by HEC-RAS with a note for each culvert within the model. These warnings and notes are expected when running sub-critical flow regimes for a steady flow analysis on steep sites.

HEC-RAS gives a warning message when the upstream conveyance ratio divided by the downstream conveyance ratio is less than 0.7 or greater than 1.4. Again, this is a result of the steep slopes on the Site, and it was not feasible to put enough cross-sections such that the difference in the conveyance ratio is less than 0.7 or greater than 1.4.

There are a number of warning messages generated by the HEC-RAS computer program for the hydraulic analysis of the project. These warnings do not affect the accuracy of the results and are intended to alert the user of any conditions outside of the expected norm. These warning messages, and notes for both the Developed Conditions and the Existing Conditions models were ignored, and the model was determined to be acceptable.

5.4.3 Hydraulic Analysis of Culverts

For analysis of anticipated additional culvert roadway crossings, the computer programs AutoCad Civil 3D *Hydroflow* (Version 10.5), CulvertMaster and/or HY-8 will be used for final design. Site characteristics and flow are entered into the program and the resulting pipe sizes, flow regime, headwater and tailwater values are calculated.

6.0 DRAINAGE PLAN REQUIREMENTS

6.1 Drainage System Requirements

The Site is being rezoned to approximately 44-acres of R4 zoning and approximately 48-acres of Open Space (OS) zoning. There are specific drainage system requirements in order for the proposed drainage design to be approved for the Site by the City of Scottsdale and are as follows:

1. According to the City of Scottsdale's Floodplain Ordinance for property located within the ESL, storm water storage may be waived under certain conditions and peak discharges from the Site reduced to at least pre-development values during the 100-year, 10-year and 2-year storm frequencies. The development must obtain a Stormwater Storage Waiver from the City of Scottsdale. In addition to the Stormwater Storage Waiver, the Site must either provide first-flush treatment and/or first-flush stormwater storage for the first 0.5-inch of runoff from the property's developed areas.

2. The proposed drainage system is being designed to allow existing drainage patterns to be maintained in their natural condition and location where possible. When the proposed development will disturb existing washes with peak 100-year discharges of 50 cfs or more, the washes will be modified to re-direct flow around and/or through the development to maintain historical flow patterns. The development must obtain a Wash Modification approval from the City of Scottsdale.

3. Any proposed development encroachment into the FEMA FIRM SFHAs must obtain an FCDMC Floodplain Use Permit.

4. The determination of the CWA Section 404 Jurisdictional Washes for the Site must be approved by the U.S. Army Corps.

5. Before any construction activities that will disturb one or more acres begin, these activities must be authorized by ADEQ under the Arizona Pollutant Discharge Elimination System (AZPDES) Construction General Permit. The City of Scottsdale also requires evidence of compliance before issuing development permits.

6.2 Easement Requirements

Where flows from the 100-year storm event are greater than 50 cfs, drainage easements will be required around the limits of the 100-year floodplain inundation. In addition, drainage easements will also be dedicated around the limits of the 100-year ponding for the retention and detention basins.

6.3 Roadway Crossing Requirements

In all cases, the depth of flow over streets will be in accordance with the City of Scottsdale Floodplain Ordinance and Design Standards & Policies Manual (2010).

6.4 Lowest Floor Elevations

Lowest floor (LF) elevations are to be a minimum of 12-inches above the highest adjacent 100-year water surface elevation and 14-inches above the low-site outfall. Lowest floor elevations on the grading and drainage plans for residential units reflect slab on grade conditions and cannot be lowered without agency approval in locations where 'Special Flood Hazard Areas' exist. In non-flood hazard locations, to ensure that adequate residential lot drainage can be achieved, a professional engineer should be consulted if the lowest floor elevation for the slab is proposed to be lowered, or if a basement is to be constructed.

6.5 Maintenance

Ongoing maintenance of the designed or recommended drainage systems is required to preserve the design integrity and purpose of the drainage system. Failure to provide maintenance can prevent the drainage system from performing to its intended design purpose and can result in reduced performance. Maintenance within the public right-of-way is the responsibility of the governing municipality. However, it is the responsibility of private developers, homeowner associations, etc. for facilities on private property within drainage easements and includes private streets. A regular maintenance program is required so that drainage systems perform to the level of protection or service as presented in this report and the project's plans and specifications.

Regular maintenance must be performed on detention/retention basins that are designed with sediment pools and/or are susceptible to wash sediment loads. Observation is required annually and after major storm events to monitor basin sediment load. Basins should be maintained and cleaned out in order for the drainage system to function properly.

6.6 Bank Protection

Scour protection shall be provided at all locations where the wash banks are being modified, where development is encroaching within the wash's erosion hazard setback limits and where it is necessary to protect proposed retention/detention basins. The bank protection considered may be one of a variety of choices: integrally colored soil cement and/or reinforced shotcrete/concrete, seated grouted rock riprap and/or gabion baskets. Bank protection will be designed to extend to a maximum calculated scour depth of 4-5 feet below the wash bottom. Refer to Exhibit 10 – *Developed Condition Hydraulics Map* for bank protection locations, and Appendix E for scour depth calculations.

6.7 Erosion Protection

Culverts that convey flow beneath roadways are to incorporate erosion protection at both the inlet and the outlet of the structures to dissipate energy and provide flow line scour protection. Detention and/or retention basins that utilize weir inlet and/or outlet structures will require erosion protection to prevent scour when flows overtops the weir. Bleed-off pipes will also incorporate riprap protection at pipe outlets.

7.0 CONCLUSIONS

1. The Site is located within the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas, Panel Number 04013C0884L, effective date October 16, 2013 and is located within Special Flood Hazard Areas (SFHAs) Zone AE, Other Flood Areas Zone "X" (Shaded) and Other Areas Zone "X".

2. The proposed Site development will not alter the effective FEMA SFHA floodplain and/or floodway and will not change the effective FEMA SFHA base flood elevations. This will be documented in more detail as the Site progresses into the pre-plat phase of development.

3. The Galloway Wash and Wash 'A' will be maintained in their natural location and condition where possible and will not be re-aligned.

4. According to the City of Scottsdale's Floodplain Ordinance the Site is located within the ESL and will apply for a stormwater storage waiver

5. Peak discharges from the Site will be reduced to at least pre-development values during the 100-year, 10-year and 2-year storm frequencies.

6. The Site will must provide either first flush stormwater storage for the first 0.5-inch of runoff and/or first flush treatment for the property's developed areas.

7. The proposed drainage system is being designed to allow existing drainage patterns to be maintained in their natural location and condition where possible. Where the proposed development will disturb existing washes with peak 100-year discharges of 50 cfs or more, the washes will be modified to re-direct flow around and/or through the development to maintain historical flow patterns. The development will obtain a Wash Modification approval from the City of Scottsdale.

8. Any proposed development encroachment into the FEMA FIRM SFHAs must obtain an FCDMC Floodplain Use Permit.

9. The determination of the CWA Section 404 Jurisdictional Washes for the Site must be approved by the U.S. Army Corps.

10. Before any construction activities that will disturb one or more acres begin, these activities must be authorized by ADEQ under the Arizona Pollutant Discharge Elimination System (AZPDES) Construction General Permit. The City of Scottsdale also requires evidence of compliance before issuing development permits.

11. The design of hydraulic structures is based on generally accepted engineering practices and in accordance with City of Scottsdale's requirements.

12. The drainage for the local residential roadways will be designed consistent with City of Scottsdale Ordinance 37-42(4) for the allowable depth of water on the street when the street is being utilized as a water carrier.

13. Ongoing maintenance is required for all drainage systems in order to assure design performance. Regular maintenance must be performed on detention/retention basins that are designed with sediment pools and/or are susceptible to wash sediment loads. Observation is required annually and after major storm events to monitor basin sediment load. Basins should be maintained and cleaned out in order for the drainage system to function properly.

8.0 WARNING & DISCLAIMER OF LIABILITY

Per the requirements outlined in Chapter 4 of the *City of Scottsdale Design Standards and Policies Manual* (*DS&PM*), each drainage report must include a completed 'Warning and Disclaimer of Liability' as provided within the *DS&PM* Appendix 4-1C. As such, below is a City of Scottsdale 'Warning and Disclaimer of Liability' that will be completed as the Site progress into the pre-plat phase of development.

CITY OF SCOTTSDALE

Appendix 4-1C

WARNING & DISCLAIMER OF LIABILITY

The Drainage and Floodplain Regulations and Ordinances of the City of Scottsdale are intended to "minimize the occurrence of losses, hazards and conditions adversely affecting the public health, safety and general welfare which might result from flooding caused by the surface runoff of rainfall" (Scottsdale Revised Code §37-16).

As defined in S.R.C. §37-17, a flood plain or "*Special flood hazard* area means an area having flood and/or flood related erosion hazards as shown on a FHBM or FIRM as zone A, AO, A1-30, AE, A99, AH, or E, and those areas identified as such by the floodplain administrator, delineated in accordance with subsection 37-18(b) and adopted by the floodplain board." It is possible that a property could be inundated by greater frequency flood events or by a flood greater in magnitude than a 100-year flood. Additionally, much of the Scottsdale area is a dynamic flood area; that is, the floodplains may shift from one location to another, over time, due to natural processes.

WARNING AND DISCLAIMER OF LIABILITY PURSUANT TO S.R.C §37-22
"The degree of flood protection provided by the requirements in this article is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Floods larger than the base flood can and will occur on rare occasions. Floodwater heights may be increased by man-made or natural causes. This article (Chapter 37, Article II) shall not create liability on the part of the city, any officer or employee thereof, or the federal government for any flood damages that result from reliance on this article or any administrative decision lawfully made thereunder."

Compliance with Drainage and Floodplain Regulations and Ordinances does not insure complete protection from flooding. The Floodplain Regulations and Ordinances meet established local and federal standards for floodplain management, but neither this review nor the Regulations and Ordinances take into account such flood related problems as natural erosion, streambed meander or man-made obstructions and diversions, all of which may have an adverse affect in the event of a flood. You are advised to consult your own engineer or other expert regarding these considerations.

I have read and understand the above. If I am an agent for an owner I have made the owner aware of and explained this disclaimer.

Plan Check No. ____________ Owner or Agent ____________ Date ____________

Design Standards & Policies Manual
City of Scottsdale - January 2010

Page 1 of 1

9.0 REFERENCES

1. *Design Standards and Policies Manual Chapter 4 Drainage*, City of Scottsdale, January 2010.
2. *Drainage Design Manual for Maricopa County, Arizona: Volume I – Hydrology,* Flood Control District of Maricopa County, revised August 15, 2013.
3. *Drainage Design Manual for Maricopa County, Arizona: Volume II – Hydraulics*, Flood Control District of Maricopa County, revised August 15, 2013.
4. *HEC-1, Flood Hydrograph Package*, U.S. Army Corps of Engineers, June 1998.
5. *HEC-RAS, Version 4.1.0*, U.S. Army Corps of Engineers, January 2010.
6. *Drainage Design Management System for Windows-Version 4.624d,* Flood Control District of Maricopa County, revised September 17, 2013, by KVL Consultants, Inc.

APPENDIX A

Existing Condition Hydrologic Calculations

DDMSW Output Data

2-year HEC-1 Model

10-year HEC-1 Model

100-year HEC-1 Model

DDMSW Output Data

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
A1	645	33	64533	0.085	43.00	0.230	-	100	
	645	40	64540	0.083	42.20	0.170	-	100	
	645	93	64593	0.023	11.50	0.330	-	100	
	645	96	64596	0.007	3.30	0.070	-	100	
A2	645	93	64593	0.010	69.20	0.330	-	100	
	645	96	64596	0.005	30.80	0.070	-	100	
B1	645	33	64533	0.000	0.90	0.230	-	100	
	645	93	64593	0.011	99.10	0.330	-	100	
C1	645	93	64593	0.008	100.00	0.330	-	100	
D1	645	93	64593	0.002	100.00	0.330	-	100	
E1	645	33	64533	0.022	100.00	0.230	-	100	
E2	645	33	64533	0.001	100.00	0.230	-	100	
E3	645	33	64533	0.038	100.00	0.230	-	100	
E4	645	6	6456	0.043	4.60	0.620	-	100	
	645	33	64533	0.712	77.30	0.230	-	100	
	645	34	64534	0.004	0.50	0.230	-	100	
	645	40	64540	0.014	1.50	0.170	-	100	
	645	63	64563	0.079	8.60	0.140	25.00	100	
	645	96	64596	0.069	7.50	0.070	-	100	
E5	645	6	6456	0.019	29.70	0.620	-	100	
	645	33	64533	0.013	21.40	0.230	-	100	
	645	93	64593	0.010	16.10	0.330	-	100	
	645	96	64596	0.021	32.70	0.070	-	100	
F1	645	96	64596	0.001	100.00	0.070	-	100	
G1	645	34	64534	0.007	94.40	0.230	-	100	
	645	96	64596	0.000	5.60	0.070	-	100	
H1	645	34	64534	0.005	100.00	0.230	-	100	
I1	645	34	64534	0.006	100.00	0.230	-	100	
J1	645	34	64534	0.003	94.30	0.230	-	100	
	645	96	64596	0.000	5.70	0.070	-	100	
K1	645	33	64533	0.004	17.50	0.230	-	100	
	645	34	64534	0.015	75.00	0.230	-	100	
	645	96	64596	0.002	7.50	0.070	-	100	
L1	645	33	64533	0.003	100.00	0.230	-	100	
M1	645	33	64533	0.002	100.00	0.230	-	100	

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn	Description
Major Basin ID: 01									
A1	901	0.0181	9.2	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
	902	0.1792	90.8	0.30	5	30.0	NORMAL	0.040	Rural (1 dwelling unit per acre or less)
		0.1973	**100.0**						
A2	900	0.0146	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0146	**100.0**						
B1	900	0.0115	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0115	**100.0**						
C1	900	0.0084	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0084	**100.0**						
D1	900	0.0024	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0024	**100.0**						
E1	900	0.0018	8.3	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
	901	0.0045	20.7	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
	902	0.0154	71.0	0.30	5	30.0	NORMAL	0.040	Rural (1 dwelling unit per acre or less)
		0.0217	**100.0**						
E2	900	0.0012	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0012	**100.0**						
E3	900	0.0038	10.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
	901	0.0057	15.0	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
	902	0.0285	75.0	0.30	5	30.0	NORMAL	0.040	Rural (1 dwelling unit per acre or less)
		0.0380	**100.0**						

* Non default value

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn	Description
Major Basin ID: 01									
E4	130	0.0074	0.8	0.18	15	35.0	NORMAL	0.040	Large Lot Residential - Single Family (1 du per acre to 2 du
	150	0.0250	2.7	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	220	0.0067	0.7	0.07	80	10.0	NORMAL	0.020	Neighborhood Retail Center
	900	0.1237	13.5	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
	901	0.2047	22.3	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
	902	0.5446	59.3	0.30	5	30.0	NORMAL	0.040	Rural (1 dwelling unit per acre or less)
	903	0.0066	0.7	0.20	0	35.0	NORMAL	0.050	Dedicated Open Space
		0.9187	**100.0**						
E5	900	0.0626	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0626	**100.0**						
F1	900	0.0012	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0012	**100.0**						
G1	900	0.0071	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0071	**100.0**						
H1	900	0.0051	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0051	**100.0**						
I1	900	0.0064	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0064	**100.0**						
J1	900	0.0035	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0035	**100.0**						
K1	900	0.0200	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: DM19 EX

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn	Description
Major Basin ID: 01									
		0.0200	**100.0**						
L1	900	0.0027	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0027	**100.0**						
M1	900	0.0015	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0015	**100.0**						

Area ID	Sub Basin Parameters								Rainfall Losses				
	Area (sq mi)	Length (mi)	Slope (ft/mi)	S-Graph	Lca (mi)	Lag (min)	Velocity (f/s)	Kn	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)
Major Basin ID: 01													
A1	0.197	0.95	134.1	DESERT/RANGE	0.51	16.80	4.96	0.039	0.29	0.25	5.34	0.258	5
A2	0.015	0.19	118.3	DESERT/RANGE	0.10	5.10	3.20	0.040	0.35	0.37	5.24	0.250	
B1	0.011	0.22	209.1	DESERT/RANGE	0.10	4.90	3.96	0.040	0.35	0.35	4.33	0.401	
C1	0.008	0.21	216.3	DESERT/RANGE	0.09	4.60	4.00	0.040	0.35	0.35	4.33	0.403	
D1	0.002	0.09	252.9	DESERT/RANGE	0.04	2.30	3.27	0.040	0.35	0.35	4.33	0.403	
E1	0.022	0.31	184.7	DESERT/RANGE	0.15	6.40	4.35	0.038	0.28	0.26	5.05	0.306	4
E2	0.001	0.05	297.9	DESERT/RANGE	0.02	1.40	3.00	0.040	0.35	0.36	5.05	0.281	
E3	0.038	0.57	146.3	DESERT/RANGE	0.25	10.40	4.85	0.039	0.29	0.26	5.05	0.299	4
E4	0.921	3.33	259.5	DESERT/RANGE	1.69	36.70	7.99	0.038	0.28	0.27	5.24	0.281	6
E5	0.063	0.39	123.7	DESERT/RANGE	0.23	9.20	3.71	0.040	0.35	0.36	5.14	0.272	
F1	0.001	0.05	215.7	DESERT/RANGE	0.02	1.50	2.96	0.040	0.35	0.30	7.94	0.085	
G1	0.007	0.24	167.4	DESERT/RANGE	0.09	5.10	4.15	0.040	0.35	0.36	5.14	0.264	
H1	0.005	0.17	189.3	DESERT/RANGE	0.07	3.90	3.77	0.040	0.35	0.36	5.05	0.281	
I1	0.006	0.23	191.1	DESERT/RANGE	0.11	5.20	3.80	0.040	0.35	0.36	5.05	0.281	
J1	0.003	0.16	206.5	DESERT/RANGE	0.07	3.80	3.64	0.040	0.35	0.36	5.14	0.262	
K1	0.020	0.23	171.7	DESERT/RANGE	0.15	6.10	3.38	0.040	0.35	0.37	5.24	0.257	
L1	0.003	0.12	243.7	DESERT/RANGE	0.05	2.90	3.62	0.040	0.35	0.36	5.05	0.281	
M1	0.001	0.10	204.1	DESERT/RANGE	0.04	2.60	3.38	0.040	0.35	0.36	5.05	0.281	

* Non default value

2-year HEC-1 Model

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1*****************************************                                     ****************************************
 *                                        *                                     *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                                     *   U.S. ARMY CORPS OF ENGINEERS       *
 *           JUN  1998                    *                                     *   HYDROLOGIC ENGINEERING CENTER      *
 *         VERSION 4.1                    *                                     *        609 SECOND STREET             *
 *                                        *                                     *     DAVIS, CALIFORNIA 95616          *
 * RUN DATE   15JUN16  TIME  20:29:19     *                                     *        (916) 756-1104                *
 *                                        *                                     *                                      *
*****************************************                                       ****************************************


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


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                               HEC-1 INPUT                                                     PAGE  1

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1          ID        Flood Control District of Maricopa County
            2          ID        DM19 EX - Desert Mountain 19 Existing Condition
            3          ID        2 YEAR
            4          ID        6 Hour  Storm
            5          ID        Unit Hydrograph: S-Graph
            6          ID        Storm: Multiple
            7          ID        06/14/2016
            8          ID        WOOD/PATEL FILE NAME: DM19EX2.DAT
                       *DIAGRAM
            9          IT       1  1JAN99       0    2000
           10          IO       5
           11          IN      15
                       *
           12          JD  1.475 0.0001
           13          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           14          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           15          PC   0.962   0.972   0.983   0.991   1.000
           16          JD  1.466 0.5000
           17          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           18          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           19          PC   0.962   0.972   0.983   0.991   1.000
           20          JD  1.438 2.8
           21          PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
           22          PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
           23          PC   0.950   0.963   0.975   0.988   1.000
                       *

           24          KK      A1   BASIN
           25          BA   0.197
           26          LG    0.29    0.25    5.34    0.26       5
           27          UI       0      39      39      39      50     114     146     182     223     254
           28          UI     279     323     344     355     374     378     378     369     357     338
           29          UI     302     275     245     222     200     181     164     147     133     120
           30          UI     108      94      88      75      74      62      61      53      42      42
           31          UI      42      31      27      27      27      27      25      10      10      10
           32          UI      10      10      10      10      10      10      10      10      10      10
           33          UI      10      10       0       0       0       0       0       0       0       0
                       *

           34          KK    R-A1   ROUTE
           35          RS       4    FLOW
           36          RC   0.060   0.040   0.060     980  0.0224   19.00
           37          RX    0.00   42.00   73.00  106.00  196.00  225.00  251.00  295.00
           38          RY   20.00   15.00   10.00    7.00    6.00    5.00   13.00   19.00
                       *

           39          KK      A2   BASIN
           40          BA   0.015
           41          LG    0.35    0.37    5.24    0.25       0
           42          UI       0      10      31      61      85      95      85      63      45      32
           43          UI      22      16      11       8       6       2       2       2       2       0
           44          UI       0       0       0       0       0       0       0       0       0       0
           45          UI       0       0       0       0       0       0       0       0       0       0
           46          UI       0       0       0       0       0       0       0       0       0       0
                       *
1                                               HEC-1 INPUT                                                     PAGE  2

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           47          KK   CP-A2 COMBINE
           48          HC       2    .212
                       *

           49          KK      B1   BASIN
           50          BA   0.011
           51          LG    0.35    0.35    4.33    0.40       0
```

```
    52          UI       0       8      25      49      67      72      62      44      31      21
    53          UI      15      10       7       5       3       2       2       2       2       0
    54          UI       0       0       0       0       0       0       0       0       0       0
    55          UI       0       0       0       0       0       0       0       0       0       0
    56          UI       0       0       0       0       0       0       0       0       0       0
                *

    57          KK      C1   BASIN
    58          BA   0.008
    59          LG    0.35    0.35    4.33    0.40       0
    60          UI       0       6      22      41      54      55      43      29      20      13
    61          UI      10       6       4       3       1       1       1       0       0       0
    62          UI       0       0       0       0       0       0       0       0       0       0
    63          UI       0       0       0       0       0       0       0       0       0       0
    64          UI       0       0       0       0       0       0       0       0       0       0
                *

    65          KK      D1   BASIN
    66          BA   0.002
    67          LG    0.35    0.35    4.33    0.40       0
    68          UI       0       7      24      24      12       6       3       1       1       0
    69          UI       0       0       0       0       0       0       0       0       0       0
    70          UI       0       0       0       0       0       0       0       0       0       0
    71          UI       0       0       0       0       0       0       0       0       0       0
    72          UI       0       0       0       0       0       0       0       0       0       0
                *

    73          KK   CLEAR COMBINE
    74          HC       3
                *
                *

    75          KK      E1   BASIN
    76          BA   0.022
    77          LG    0.28    0.26    5.05    0.31       4
    78          UI       0      12      23      55      81     101     111     106      88      66
    79          UI      51      39      29      23      17      12       9       8       5       3
    80          UI       3       3       3       3       0       0       0       0       0       0
    81          UI       0       0       0       0       0       0       0       0       0       0
    82          UI       0       0       0       0       0       0       0       0       0       0
                *
1                                              HEC-1 INPUT                                             PAGE  3

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


    83          KK      E2   BASIN
    84          BA   0.001
    85          LG    0.35    0.36    5.05    0.28       0
    86          UI       0      10      19       7       2       1       0       0       0       0
    87          UI       0       0       0       0       0       0       0       0       0       0
    88          UI       0       0       0       0       0       0       0       0       0       0
    89          UI       0       0       0       0       0       0       0       0       0       0
    90          UI       0       0       0       0       0       0       0       0       0       0
                *

    91          KK      E3   BASIN
    92          BA   0.038
    93          LG    0.29    0.26    5.05    0.30       4
    94          UI       0      12      12      26      47      66      83      99     110     117
    95          UI     118     113     105      88      74      63      54      45      38      32
    96          UI      27      23      19      17      13      13       8       8       8       5
    97          UI       3       3       3       3       3       3       3       3       3       0
    98          UI       0       0       0       0       0       0       0       0       0       0
                *

    99          KK      E4   BASIN
   100          BA   0.921
   101          LG    0.28    0.27    5.24    0.28       6
   102          UI       0      84      84      84      84      84      84      84      84     173
   103          UI     243     243     297     329     364     405     445     470     511     545
   104          UI     580     602     598     694     695     721     747     752     771     764
   105          UI     810     810     810     810     810     810     803     777     766     760
   106          UI     748     720     694     650     614     589     589     531     511     494
   107          UI     463     445     432     399     393     367     360     329     329     299
   108          UI     299     274     259     259     235     231     231     198     189     189
   109          UI     188     159     159     159     159     143     130     130     130     130
   110          UI     128      90      90      90      90      90      90      90      87      58
   111          UI      58      58      58      58      58      58      58      58      58      58
   112          UI      58      30      21      21      21      21      21      21      21      21
   113          UI      21      21      21      21      21      21      21      21      21      21
   114          UI      21      21      21      21      21      21      21      21      21      21
   115          UI      21      21      21      21      21       0       0       0       0       0
                *

   116          KK   CP-E4 COMBINE
   117          HC       4    .982
                *

   118          KK  R-CPE4   ROUTE
   119          RS       1    FLOW
   120          RC   0.060   0.040   0.060    2050  0.0234 2635.00
   121          RX    0.00   33.00   50.00  130.00  345.00  390.00  447.00  530.00
   122          RY   34.00   25.00   18.00   19.00   18.00   20.00   26.00   32.00
                *
1                                              HEC-1 INPUT                                             PAGE  4

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


   123          KK      E5   BASIN
   124          BA   0.063
   125          LG    0.35    0.36    5.14    0.27       0
   126          UI       0      23      23      65     105     143     176     204     217     221
   127          UI     209     184     152     126     105      86      71      58      48      41
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 128          UI     35     25     24     16     16     16      7      6      6      6
 129          UI      6      6      6      6      0      0      0      0      0      0
 130          UI      0      0      0      0      0      0      0      0      0      0
              *

 131          KK  CP-E5 COMBINE
 132          HC      2  1.044
              *

 133          KK     F1  BASIN
 134          BA  0.001
 135          LG   0.35   0.30   7.94   0.09      0
 136          UI      0      9     19      8      2      1      0      0      0      0
 137          UI      0      0      0      0      0      0      0      0      0      0
 138          UI      0      0      0      0      0      0      0      0      0      0
 139          UI      0      0      0      0      0      0      0      0      0      0
 140          UI      0      0      0      0      0      0      0      0      0      0
              *

 141          KK     G1  BASIN
 142          BA  0.007
 143          LG   0.35   0.36   5.14   0.26      0
 144          UI      0      5     14     28     40     44     40     29     21     15
 145          UI     10      8      5      4      3      1      1      1      1      0
 146          UI      0      0      0      0      0      0      0      0      0      0
 147          UI      0      0      0      0      0      0      0      0      0      0
 148          UI      0      0      0      0      0      0      0      0      0      0
              *

 149          KK     H1  BASIN
 150          BA  0.005
 151          LG   0.35   0.36   5.05   0.28      0
 152          UI      0      5     20     35     41     34     22     14      9      6
 153          UI      4      2      1      1      1      0      0      0      0      0
 154          UI      0      0      0      0      0      0      0      0      0      0
 155          UI      0      0      0      0      0      0      0      0      0      0
 156          UI      0      0      0      0      0      0      0      0      0      0
              *

 157          KK     I1  BASIN
 158          BA  0.006
 159          LG   0.35   0.36   5.05   0.28      0
 160          UI      0      4     12     24     33     37     34     26     18     13
 161          UI      9      7      5      3      3      1      1      1      1      1
 162          UI      0      0      0      0      0      0      0      0      0      0
 163          UI      0      0      0      0      0      0      0      0      0      0
 164          UI      0      0      0      0      0      0      0      0      0      0
              *
```



```
 165          KK   CLR2 COMBINE
 166          HC      4
              *
              *

 167          KK     J1  BASIN
 168          BA  0.003
 169          LG   0.35   0.36   5.14   0.26      0
 170          UI      0      3     13     22     25     20     13      8      5      3
 171          UI      2      1      1      1      0      0      0      0      0      0
 172          UI      0      0      0      0      0      0      0      0      0      0
 173          UI      0      0      0      0      0      0      0      0      0      0
 174          UI      0      0      0      0      0      0      0      0      0      0
              *

 175          KK     K1  BASIN
 176          BA  0.020
 177          LG   0.35   0.37   5.24   0.26      0
 178          UI      0     11     25     55     81    100    106     97     75     57
 179          UI     43     32     23     18     13     10      8      6      3      3
 180          UI      3      3      3      0      0      0      0      0      0      0
 181          UI      0      0      0      0      0      0      0      0      0      0
 182          UI      0      0      0      0      0      0      0      0      0      0
              *

 183          KK     L1  BASIN
 184          BA  0.003
 185          LG   0.35   0.36   5.05   0.28      0
 186          UI      0      6     23     33     25     14      7      4      2      1
 187          UI      1      0      0      0      0      0      0      0      0      0
 188          UI      0      0      0      0      0      0      0      0      0      0
 189          UI      0      0      0      0      0      0      0      0      0      0
 190          UI      0      0      0      0      0      0      0      0      0      0
              *

 191          KK     M1  BASIN
 192          BA  0.001
 193          LG   0.35   0.36   5.05   0.28      0
 194          UI      0      3      9     12      7      4      2      1      0      0
 195          UI      0      0      0      0      0      0      0      0      0      0
 196          UI      0      0      0      0      0      0      0      0      0      0
 197          UI      0      0      0      0      0      0      0      0      0      0
 198          UI      0      0      0      0      0      0      0      0      0      0
              *
 199          ZZ
```

```
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

   24          A1
                V
                V
   34        R-A1
                .
                .
   39           .          A2
                .           .
                .           .
   47       CP-A2............
                .
                .
   49           .          B1
                .           .
                .           .
   57           .           .          C1
                .           .           .
                .           .           .
   65           .           .           .          D1
                .           .           .           .
                .           .           .           .
   73           .       CLEAR........................
                .           .
                .           .
   75           .           .          E1
                .           .           .
                .           .           .
   83           .           .           .          E2
                .           .           .           .
                .           .           .           .
   91           .           .           .           .          E3
                .           .           .           .           .
                .           .           .           .           .
   99           .           .           .           .           .          E4
                .           .           .           .           .           .
                .           .           .           .           .           .
  116           .           .       CP-E4....................................
                .           .           V
                .           .           V
  118           .           .      R-CPE4
                .           .           .
                .           .           .
  123           .           .           .          E5
                .           .           .           .
                .           .           .           .
  131           .           .       CP-E5............
                .           .           .
                .           .           .
  133           .           .           .          F1
                .           .           .           .
                .           .           .           .
  141           .           .           .           .          G1
                .           .           .           .           .
                .           .           .           .           .
  149           .           .           .           .           .          H1
                .           .           .           .           .           .
                .           .           .           .           .           .
  157           .           .           .           .           .           .          I1
                .           .           .           .           .           .           .
                .           .           .           .           .           .           .
  165           .           .           .        CLR2....................................
                .           .           .           .
                .           .           .           .
  167           .           .           .           .          J1
                .           .           .           .           .
                .           .           .           .           .
  175           .           .           .           .           .          K1
                .           .           .           .           .           .
                .           .           .           .           .           .
  183           .           .           .           .           .           .          L1
                .           .           .           .           .           .           .
                .           .           .           .           .           .           .
  191           .           .           .           .           .           .           .        M1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1*****************************************                          ****************************************
 *                                       *                          *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                          *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN  1998                *                          *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1                *                          *         609 SECOND STREET            *
 *                                       *                          *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   15JUN16  TIME  20:29:19   *                          *          (916) 756-1104              *
 *                                       *                          *                                      *
 *****************************************                          ****************************************
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```
                              Flood Control District of Maricopa County
                              DM19 EX - Desert Mountain 19 Existing Condition
                              2 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: S-Graph
                              Storm: Multiple
                              06/14/2016
                              WOOD/PATEL FILE NAME: DM19EX2.DAT

  10 IO           OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT           HYDROGRAPH TIME DATA
                         NMIN          1  MINUTES IN COMPUTATION INTERVAL
                        IDATE     1JAN99  STARTING DATE
                        ITIME       0000  STARTING TIME
                           NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE     2JAN99  ENDING DATE
                       NDTIME       0919  ENDING TIME
                        ICENT         19  CENTURY MARK

                    COMPUTATION INTERVAL     .02 HOURS
                         TOTAL TIME BASE   33.32 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT

  12 JD           INDEX STORM NO. 1
                         STRM       1.48  PRECIPITATION DEPTH
                         TRDA        .00  TRANSPOSITION DRAINAGE AREA

  13 PI             PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                       .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                       .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                       .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                       .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                       .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                       .01       .01       .01       .01       .01       .00       .00       .00       .00       .00
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                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  16 JD           INDEX STORM NO. 2
                         STRM       1.47  PRECIPITATION DEPTH
                         TRDA        .50  TRANSPOSITION DRAINAGE AREA

  17 PI             PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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.01	.01	.01	.01	.01	.03	.03	.03	.03	.03
.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

20 JD INDEX STORM NO. 3
STRM 1.44 PRECIPITATION DEPTH
TRDA 2.80 TRANSPOSITION DRAINAGE AREA

21 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	A1	131.	4.15	9.	2.	2.	.20		
+	ROUTED TO	R-A1	128.	4.22	9.	2.	2.	.20		
+	HYDROGRAPH AT	A2	13.	4.03	0.	0.	0.	.01		
+	2 COMBINED AT	CP-A2	128.	4.22	10.	2.	2.	.21		
+	HYDROGRAPH AT	B1	8.	4.03	0.	0.	0.	.01		
+	HYDROGRAPH AT	C1	6.	4.03	0.	0.	0.	.01		
+	HYDROGRAPH AT	D1	2.	4.02	0.	0.	0.	.00		
+	3 COMBINED AT	CLEAR	16.	4.03	0.	0.	0.	.02		
+	HYDROGRAPH AT	E1	21.	4.03	1.	0.	0.	.02		
+	HYDROGRAPH AT	E2	1.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	E3	31.	4.08	2.	0.	0.	.04		
+	HYDROGRAPH AT	E4	236.	4.43	33.	8.	6.	.92		
+	4 COMBINED AT	CP-E4	230.	4.43	34.	9.	6.	.98		
+	ROUTED TO	R-CPE4	230.	4.43	34.	9.	6.	.98		
+	HYDROGRAPH AT	E5	44.	4.07	2.	0.	0.	.06		
+	2 COMBINED AT	CP-E5	230.	4.43	35.	9.	6.	1.04		
+	HYDROGRAPH AT	F1	1.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	G1	6.	4.03	0.	0.	0.	.01		
+	HYDROGRAPH AT	H1	5.	4.03	0.	0.	0.	.00		
+	HYDROGRAPH AT	I1	5.	4.03	0.	0.	0.	.01		
+	4 COMBINED AT	CLR2	17.	4.02	1.	0.	0.	.02		
+	HYDROGRAPH AT	J1	3.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	K1	17.	4.05	1.	0.	0.	.02		
+	HYDROGRAPH AT	L1	3.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	M1	1.	4.02	0.	0.	0.	.00		

*** NORMAL END OF HEC-1 ***

10-year HEC-1 Model

```
1*****************************************                                                   *****************************************
 *                                       *                                                   *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *   U.S. ARMY CORPS OF ENGINEERS        *
 *             JUN  1998                 *                                                   *   HYDROLOGIC ENGINEERING CENTER       *
 *           VERSION 4.1                 *                                                   *        609 SECOND STREET              *
 *                                       *                                                   *     DAVIS, CALIFORNIA 95616           *
 * RUN DATE   15JUN16  TIME  20:29:28    *                                                   *        (916) 756-1104                 *
 *                                       *                                                   *                                       *
*****************************************                                                    *****************************************


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


           THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

           THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
           THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
           NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
           DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
           KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                HEC-1 INPUT                                                   PAGE  1

           LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

             1          ID       Flood Control District of Maricopa County
             2          ID       DM19 EX - Desert Mountain 19 Existing Condition
             3          ID       10 YEAR
             4          ID       6 Hour  Storm
             5          ID       Unit Hydrograph: S-Graph
             6          ID       Storm: Multiple
             7          ID       06/14/2016
             8          ID       WOOD/PATEL FILE NAME: DM19EX10.DAT
                        *DIAGRAM
             9          IT       1  1JAN99       0    2000
            10          IO       5
            11          IN      15
                        *
            12          JD  2.182 0.0001
            13          PC  0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            14          PC  0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            15          PC  0.962   0.972   0.983   0.991   1.000
            16          JD  2.169 0.5000
            17          PC  0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            18          PC  0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            19          PC  0.962   0.972   0.983   0.991   1.000
            20          JD  2.127 2.8
            21          PC  0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
            22          PC  0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
            23          PC  0.950   0.963   0.975   0.988   1.000
                        *

            24          KK      A1   BASIN
            25          BA  0.197
            26          LG   0.29    0.25    5.34    0.26       5
            27          UI      0      39      39      39      50     114     146     182     223     254
            28          UI    279     323     344     355     374     378     378     369     357     338
            29          UI    302     275     245     222     200     181     164     147     133     120
            30          UI    108      94      88      75      74      62      61      53      42      42
            31          UI     42      31      27      27      27      27      25      10      10      10
            32          UI     10      10      10      10      10      10      10      10      10      10
            33          UI     10      10       0       0       0       0       0       0       0       0
                        *

            34          KK    R-A1   ROUTE
            35          RS       3    FLOW
            36          RC  0.060   0.040   0.060     980  0.0224   19.00
            37          RX   0.00   42.00   73.00  106.00  196.00  225.00  251.00  295.00
            38          RY  20.00   15.00   10.00    7.00    6.00    5.00   13.00   19.00
                        *

            39          KK      A2   BASIN
            40          BA  0.015
            41          LG   0.35    0.37    5.24    0.25       0
            42          UI      0      10      31      61      85      95      85      63      45      32
            43          UI     22      16      11       8       6       2       2       2       2       0
            44          UI      0       0       0       0       0       0       0       0       0       0
            45          UI      0       0       0       0       0       0       0       0       0       0
            46          UI      0       0       0       0       0       0       0       0       0       0
                        *
1                                                HEC-1 INPUT                                                   PAGE  2

           LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            47          KK   CP-A2 COMBINE
            48          HC       2    .212
                        *

            49          KK      B1   BASIN
            50          BA  0.011
            51          LG   0.35    0.35    4.33    0.40       0
```

```
  52          UI       0       8      25      49      67      72      62      44      31      21
  53          UI      15      10       7       5       3       2       2       2       2       0
  54          UI       0       0       0       0       0       0       0       0       0       0
  55          UI       0       0       0       0       0       0       0       0       0       0
  56          UI       0       0       0       0       0       0       0       0       0       0
              *

  57          KK      C1   BASIN
  58          BA   0.008
  59          LG    0.35    0.35    4.33    0.40       0
  60          UI       0       6      22      41      54      55      43      29      20      13
  61          UI      10       6       4       3       1       1       1       0       0       0
  62          UI       0       0       0       0       0       0       0       0       0       0
  63          UI       0       0       0       0       0       0       0       0       0       0
  64          UI       0       0       0       0       0       0       0       0       0       0
              *

  65          KK      D1   BASIN
  66          BA   0.002
  67          LG    0.35    0.35    4.33    0.40       0
  68          UI       0       7      24      24      12       6       3       1       1       0
  69          UI       0       0       0       0       0       0       0       0       0       0
  70          UI       0       0       0       0       0       0       0       0       0       0
  71          UI       0       0       0       0       0       0       0       0       0       0
  72          UI       0       0       0       0       0       0       0       0       0       0
              *

  73          KK   CLEAR COMBINE
  74          HC       3
              *
              *

  75          KK      E1   BASIN
  76          BA   0.022
  77          LG    0.28    0.26    5.05    0.31       4
  78          UI       0      12      23      55      81     101     111     106      88      66
  79          UI      51      39      29      23      17      12       9       8       5       3
  80          UI       3       3       3       3       0       0       0       0       0       0
  81          UI       0       0       0       0       0       0       0       0       0       0
  82          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                           HEC-1 INPUT                                          PAGE  3

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  83          KK      E2   BASIN
  84          BA   0.001
  85          LG    0.35    0.36    5.05    0.28       0
  86          UI       0      10      19       7       2       1       0       0       0       0
  87          UI       0       0       0       0       0       0       0       0       0       0
  88          UI       0       0       0       0       0       0       0       0       0       0
  89          UI       0       0       0       0       0       0       0       0       0       0
  90          UI       0       0       0       0       0       0       0       0       0       0
              *

  91          KK      E3   BASIN
  92          BA   0.038
  93          LG    0.29    0.26    5.05    0.30       4
  94          UI       0      12      12      26      47      66      83      99     110     117
  95          UI     118     113     105      88      74      63      54      45      38      32
  96          UI      27      23      19      17      13      13       8       8       8       5
  97          UI       3       3       3       3       3       3       3       3       3       0
  98          UI       0       0       0       0       0       0       0       0       0       0
              *

  99          KK      E4   BASIN
 100          BA   0.921
 101          LG    0.28    0.27    5.24    0.28       6
 102          UI       0      84      84      84      84      84      84      84      84     173
 103          UI     243     243     297     329     364     405     445     470     511     545
 104          UI     580     602     598     694     695     721     747     752     771     764
 105          UI     810     810     810     810     810     810     803     777     766     760
 106          UI     748     720     694     650     614     589     589     531     511     494
 107          UI     463     445     432     399     393     367     360     329     329     299
 108          UI     299     274     259     259     235     231     231     198     189     189
 109          UI     188     159     159     159     159     143     130     130     130     130
 110          UI     128      90      90      90      90      90      90      90      87      58
 111          UI      58      58      58      58      58      58      58      58      58      58
 112          UI      58      30      21      21      21      21      21      21      21      21
 113          UI      21      21      21      21      21      21      21      21      21      21
 114          UI      21      21      21      21      21      21      21      21      21      21
 115          UI      21      21      21      21      21       0       0       0       0       0
              *

 116          KK   CP-E4 COMBINE
 117          HC       4    .982
              *

 118          KK  R-CPE4   ROUTE
 119          RS       1    FLOW
 120          RC   0.060   0.040   0.060    2050  0.0234 2635.00
 121          RX    0.00   33.00   50.00  130.00  345.00  390.00  447.00  530.00
 122          RY   34.00   25.00   18.00   19.00   18.00   20.00   26.00   32.00
              *
1                                           HEC-1 INPUT                                          PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 123          KK      E5   BASIN
 124          BA   0.063
 125          LG    0.35    0.36    5.14    0.27       0
 126          UI       0      23      23      65     105     143     176     204     217     221
 127          UI     209     184     152     126     105      86      71      58      48      41
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      128          UI      35      25      24      16      16      16       7       6       6       6
      129          UI       6       6       6       6       0       0       0       0       0       0
      130          UI       0       0       0       0       0       0       0       0       0       0
                   *

      131          KK   CP-E5 COMBINE
      132          HC       2   1.044
                   *

      133          KK      F1   BASIN
      134          BA   0.001
      135          LG    0.35    0.30    7.94    0.09       0
      136          UI       0       9      19       8       2       1       0       0       0       0
      137          UI       0       0       0       0       0       0       0       0       0       0
      138          UI       0       0       0       0       0       0       0       0       0       0
      139          UI       0       0       0       0       0       0       0       0       0       0
      140          UI       0       0       0       0       0       0       0       0       0       0
                   *

      141          KK      G1   BASIN
      142          BA   0.007
      143          LG    0.35    0.36    5.14    0.26       0
      144          UI       0       5      14      28      40      44      40      29      21      15
      145          UI      10       8       5       4       3       1       1       1       1       0
      146          UI       0       0       0       0       0       0       0       0       0       0
      147          UI       0       0       0       0       0       0       0       0       0       0
      148          UI       0       0       0       0       0       0       0       0       0       0
                   *

      149          KK      H1   BASIN
      150          BA   0.005
      151          LG    0.35    0.36    5.05    0.28       0
      152          UI       0       5      20      35      41      34      22      14       9       6
      153          UI       4       2       1       1       1       0       0       0       0       0
      154          UI       0       0       0       0       0       0       0       0       0       0
      155          UI       0       0       0       0       0       0       0       0       0       0
      156          UI       0       0       0       0       0       0       0       0       0       0
                   *

      157          KK      I1   BASIN
      158          BA   0.006
      159          LG    0.35    0.36    5.05    0.28       0
      160          UI       0       4      12      24      33      37      34      26      18      13
      161          UI       9       7       5       3       3       1       1       1       1       1
      162          UI       0       0       0       0       0       0       0       0       0       0
      163          UI       0       0       0       0       0       0       0       0       0       0
      164          UI       0       0       0       0       0       0       0       0       0       0
                   *
1                                                HEC-1 INPUT                                                     PAGE  5

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


      165          KK    CLR2 COMBINE
      166          HC       4
                   *
                   *
                   *

      167          KK      J1   BASIN
      168          BA   0.003
      169          LG    0.35    0.36    5.14    0.26       0
      170          UI       0       3      13      22      25      20      13       8       5       3
      171          UI       2       1       1       1       0       0       0       0       0       0
      172          UI       0       0       0       0       0       0       0       0       0       0
      173          UI       0       0       0       0       0       0       0       0       0       0
      174          UI       0       0       0       0       0       0       0       0       0       0
                   *

      175          KK      K1   BASIN
      176          BA   0.020
      177          LG    0.35    0.37    5.24    0.26       0
      178          UI       0      11      25      55      81     100     106      97      75      57
      179          UI      43      32      23      18      13      10       8       6       3       3
      180          UI       3       3       3       0       0       0       0       0       0       0
      181          UI       0       0       0       0       0       0       0       0       0       0
      182          UI       0       0       0       0       0       0       0       0       0       0
                   *

      183          KK      L1   BASIN
      184          BA   0.003
      185          LG    0.35    0.36    5.05    0.28       0
      186          UI       0       6      23      33      25      14       7       4       2       1
      187          UI       1       0       0       0       0       0       0       0       0       0
      188          UI       0       0       0       0       0       0       0       0       0       0
      189          UI       0       0       0       0       0       0       0       0       0       0
      190          UI       0       0       0       0       0       0       0       0       0       0
                   *

      191          KK      M1   BASIN
      192          BA   0.001
      193          LG    0.35    0.36    5.05    0.28       0
      194          UI       0       3       9      12       7       4       2       1       0       0
      195          UI       0       0       0       0       0       0       0       0       0       0
      196          UI       0       0       0       0       0       0       0       0       0       0
      197          UI       0       0       0       0       0       0       0       0       0       0
      198          UI       0       0       0       0       0       0       0       0       0       0
                   *
      199          ZZ
```

```
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE        (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.        (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    24          A1
                 V
                 V
    34        R-A1
                 .
                 .
    39           .          A2
                 .           .
                 .           .
    47       CP-A2............
                 .
                 .
    49           .          B1
                 .           .
                 .           .
    57           .           .          C1
                 .           .           .
                 .           .           .
    65           .           .           .          D1
                 .           .           .           .
                 .           .           .           .
    73           .       CLEAR........................
                 .           .
                 .           .
    75           .           .          E1
                 .           .           .
                 .           .           .
    83           .           .           .          E2
                 .           .           .           .
                 .           .           .           .
    91           .           .           .           .          E3
                 .           .           .           .           .
                 .           .           .           .           .
    99           .           .           .           .           .          E4
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   116           .           .       CP-E4....................................
                 .           .           V
                 .           .           V
   118           .           .      R-CPE4
                 .           .           .
                 .           .           .
   123           .           .           .          E5
                 .           .           .           .
                 .           .           .           .
   131           .           .       CP-E5............
                 .           .           .
                 .           .           .
   133           .           .           .          F1
                 .           .           .           .
                 .           .           .           .
   141           .           .           .           .          G1
                 .           .           .           .           .
                 .           .           .           .           .
   149           .           .           .           .           .          H1
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   157           .           .           .           .           .           .          I1
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   165           .           .           .        CLR2....................................
                 .           .           .           .
                 .           .           .           .
   167           .           .           .           .          J1
                 .           .           .           .           .
                 .           .           .           .           .
   175           .           .           .           .           .          K1
                 .           .           .           .           .           .
                 .           .           .           .           .           .
   183           .           .           .           .           .           .          L1
                 .           .           .           .           .           .           .
                 .           .           .           .           .           .           .
   191           .           .           .           .           .           .           .          M1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

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1*****************************************                    *****************************************
 *                                       *                    *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *   U.S. ARMY CORPS OF ENGINEERS        *
 *             JUN  1998                 *                    *   HYDROLOGIC ENGINEERING CENTER       *
 *           VERSION 4.1                 *                    *         609 SECOND STREET             *
 *                                       *                    *      DAVIS, CALIFORNIA 95616          *
 * RUN DATE   15JUN16  TIME  20:29:28    *                    *         (916) 756-1104                *
 *                                       *                    *                                       *
*****************************************                    *****************************************
```

```
                              Flood Control District of Maricopa County
                              DM19 EX - Desert Mountain 19 Existing Condition
                              10 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: S-Graph
                              Storm: Multiple
                              06/14/2016
                              WOOD/PATEL FILE NAME: DM19EX10.DAT

  10 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT           HYDROGRAPH TIME DATA
                        NMIN           1  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1JAN99  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2JAN99  ENDING DATE
                      NDTIME        0919  ENDING TIME
                       ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL       .02 HOURS
                      TOTAL TIME BASE     33.32 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

  12 JD          INDEX STORM NO. 1
                        STRM        2.18  PRECIPITATION DEPTH
                        TRDA         .00  TRANSPOSITION DRAINAGE AREA

  13 PI            PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                        .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                        .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                        .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                        .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                        .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
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                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  16 JD          INDEX STORM NO. 2
                        STRM        2.17  PRECIPITATION DEPTH
                        TRDA         .50  TRANSPOSITION DRAINAGE AREA

  17 PI            PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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20 JD INDEX STORM NO. 3
STRM 2.13 PRECIPITATION DEPTH
TRDA 2.80 TRANSPOSITION DRAINAGE AREA

21 PI PRECIPITATION PATTERN

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.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	A1	262.	4.13	19.	5.	3.	.20		
+	ROUTED TO	R-A1	258.	4.18	19.	5.	3.	.20		
+	HYDROGRAPH AT	A2	28.	4.02	1.	0.	0.	.01		
+	2 COMBINED AT	CP-A2	261.	4.18	20.	5.	4.	.21		
+	HYDROGRAPH AT	B1	19.	4.02	1.	0.	0.	.01		
+	HYDROGRAPH AT	C1	14.	4.02	1.	0.	0.	.01		
+	HYDROGRAPH AT	D1	4.	4.02	0.	0.	0.	.00		
+	3 COMBINED AT	CLEAR	36.	4.02	1.	0.	0.	.02		
+	HYDROGRAPH AT	E1	42.	4.02	2.	0.	0.	.02		
+	HYDROGRAPH AT	E2	2.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	E3	63.	4.07	3.	1.	1.	.04		
+	HYDROGRAPH AT	E4	553.	4.43	78.	19.	14.	.92		
+	4 COMBINED AT	CP-E4	549.	4.42	82.	20.	15.	.98		
+	ROUTED TO	R-CPE4	549.	4.43	82.	20.	15.	.98		
+	HYDROGRAPH AT	E5	102.	4.05	5.	1.	1.	.06		
+	2 COMBINED AT	CP-E5	549.	4.42	85.	21.	15.	1.04		
+	HYDROGRAPH AT	F1	2.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	G1	13.	4.02	1.	0.	0.	.01		
+	HYDROGRAPH AT	H1	10.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	I1	11.	4.02	0.	0.	0.	.01		
+	4 COMBINED AT	CLR2	36.	4.02	2.	0.	0.	.02		
+	HYDROGRAPH AT	J1	6.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	K1	36.	4.03	2.	0.	0.	.02		
+	HYDROGRAPH AT	L1	6.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	M1	2.	4.02	0.	0.	0.	.00		

*** NORMAL END OF HEC-1 ***

100-year HEC-1 Model

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1*****************************************                                        ***************************************
 *                                       *                                        *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                        *   U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN  1998                *                                        *   HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1                *                                        *         609 SECOND STREET           *
 *                                       *                                        *      DAVIS, CALIFORNIA 95616        *
 * RUN DATE   15JUN16  TIME  20:29:36    *                                        *          (916) 756-1104             *
 *                                       *                                        *                                     *
*****************************************                                        ***************************************


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


         THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

         THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
         THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
         NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
         DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
         KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                         HEC-1 INPUT                                                     PAGE  1

         LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1       ID        Flood Control District of Maricopa County
           2       ID        DM19 EX - Desert Mountain 19 Existing Condition
           3       ID        100 YEAR
           4       ID        6 Hour  Storm
           5       ID        Unit Hydrograph: S-Graph
           6       ID        Storm: Multiple
           7       ID        06/14/2016
           8       ID        WOOD/PATEL FILE NAME: DM19EX100.DAT
                   *DIAGRAM
           9       IT       1  1JAN99       0    2000
          10       IO       5
          11       IN      15
                   *
          12       JD  3.313 0.0001
          13       PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
          14       PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
          15       PC   0.962   0.972   0.983   0.991   1.000
          16       JD  3.293 0.5000
          17       PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
          18       PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
          19       PC   0.962   0.972   0.983   0.991   1.000
          20       JD  3.230 2.8
          21       PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
          22       PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
          23       PC   0.950   0.963   0.975   0.988   1.000
                   *

          24       KK      A1   BASIN
          25       BA   0.197
          26       LG    0.29    0.25    5.34    0.26       5
          27       UI       0      39      39      39      50     114     146     182     223     254
          28       UI     279     323     344     355     374     378     378     369     357     338
          29       UI     302     275     245     222     200     181     164     147     133     120
          30       UI     108      94      88      75      74      62      61      53      42      42
          31       UI      42      31      27      27      27      27      25      10      10      10
          32       UI      10      10      10      10      10      10      10      10      10      10
          33       UI      10      10       0       0       0       0       0       0       0       0
                   *

          34       KK    R-A1   ROUTE
          35       RS       3    FLOW
          36       RC   0.060   0.040   0.060     980  0.0224   19.00
          37       RX    0.00   42.00   73.00  106.00  196.00  225.00  251.00  295.00
          38       RY   20.00   15.00   10.00    7.00    6.00    5.00   13.00   19.00
                   *

          39       KK      A2   BASIN
          40       BA   0.015
          41       LG    0.35    0.37    5.24    0.25       0
          42       UI       0      10      31      61      85      95      85      63      45      32
          43       UI      22      16      11       8       6       2       2       2       2       0
          44       UI       0       0       0       0       0       0       0       0       0       0
          45       UI       0       0       0       0       0       0       0       0       0       0
          46       UI       0       0       0       0       0       0       0       0       0       0
                   *
1                                         HEC-1 INPUT                                                     PAGE  2

         LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


          47       KK   CP-A2 COMBINE
          48       HC       2
                   *

          49       KK      B1   BASIN
          50       BA   0.011
          51       LG    0.35    0.35    4.33    0.40       0
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     52          UI       0       8      25      49      67      72      62      44      31      21
     53          UI      15      10       7       5       3       2       2       2       2       0
     54          UI       0       0       0       0       0       0       0       0       0       0
     55          UI       0       0       0       0       0       0       0       0       0       0
     56          UI       0       0       0       0       0       0       0       0       0       0
                 *

     57          KK      C1   BASIN
     58          BA   0.008
     59          LG    0.35    0.35    4.33    0.40       0
     60          UI       0       6      22      41      54      55      43      29      20      13
     61          UI      10       6       4       3       1       1       1       0       0       0
     62          UI       0       0       0       0       0       0       0       0       0       0
     63          UI       0       0       0       0       0       0       0       0       0       0
     64          UI       0       0       0       0       0       0       0       0       0       0
                 *

     65          KK      D1   BASIN
     66          BA   0.002
     67          LG    0.35    0.35    4.33    0.40       0
     68          UI       0       7      24      24      12       6       3       1       1       0
     69          UI       0       0       0       0       0       0       0       0       0       0
     70          UI       0       0       0       0       0       0       0       0       0       0
     71          UI       0       0       0       0       0       0       0       0       0       0
     72          UI       0       0       0       0       0       0       0       0       0       0
                 *

     73          KK   CLEAR COMBINE
     74          HC       3
                 *
                 *

     75          KK      E1   BASIN
     76          BA   0.022
     77          LG    0.28    0.26    5.05    0.31       4
     78          UI       0      12      23      55      81     101     111     106      88      66
     79          UI      51      39      29      23      17      12       9       8       5       3
     80          UI       3       3       3       3       0       0       0       0       0       0
     81          UI       0       0       0       0       0       0       0       0       0       0
     82          UI       0       0       0       0       0       0       0       0       0       0
                 *
1                                           HEC-1 INPUT                                         PAGE  3

   LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


     83          KK      E2   BASIN
     84          BA   0.001
     85          LG    0.35    0.36    5.05    0.28       0
     86          UI       0      10      19       7       2       1       0       0       0       0
     87          UI       0       0       0       0       0       0       0       0       0       0
     88          UI       0       0       0       0       0       0       0       0       0       0
     89          UI       0       0       0       0       0       0       0       0       0       0
     90          UI       0       0       0       0       0       0       0       0       0       0
                 *

     91          KK      E3   BASIN
     92          BA   0.038
     93          LG    0.29    0.26    5.05    0.30       4
     94          UI       0      12      12      26      47      66      83      99     110     117
     95          UI     118     113     105      88      74      63      54      45      38      32
     96          UI      27      23      19      17      13      13       8       8       8       5
     97          UI       3       3       3       3       3       3       3       3       3       0
     98          UI       0       0       0       0       0       0       0       0       0       0
                 *

     99          KK      E4   BASIN
    100          BA   0.921
    101          LG    0.28    0.27    5.24    0.28       6
    102          UI       0      84      84      84      84      84      84      84      84     173
    103          UI     243     243     297     329     364     405     445     470     511     545
    104          UI     580     602     598     694     695     721     747     752     771     764
    105          UI     810     810     810     810     810     810     803     777     766     760
    106          UI     748     720     694     650     614     589     589     531     511     494
    107          UI     463     445     432     399     393     367     360     329     329     299
    108          UI     299     274     259     259     235     231     231     198     189     189
    109          UI     188     159     159     159     159     143     130     130     130     130
    110          UI     128      90      90      90      90      90      90      90      87      58
    111          UI      58      58      58      58      58      58      58      58      58      58
    112          UI      58      30      21      21      21      21      21      21      21      21
    113          UI      21      21      21      21      21      21      21      21      21      21
    114          UI      21      21      21      21      21      21      21      21      21      21
    115          UI      21      21      21      21      21       0       0       0       0       0
                 *

    116          KK   CP-E4 COMBINE
    117          HC       4    .982
                 *

    118          KK  R-CPE4   ROUTE
    119          RS       1    FLOW
    120          RC   0.060   0.040   0.060    2050  0.0234 2635.00
    121          RX    0.00   33.00   50.00  130.00  345.00  390.00  447.00  530.00
    122          RY   34.00   25.00   18.00   19.00   18.00   20.00   26.00   32.00
                 *
1                                           HEC-1 INPUT                                         PAGE  4

   LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


    123          KK      E5   BASIN
    124          BA   0.063
    125          LG    0.35    0.36    5.14    0.27       0
    126          UI       0      23      23      65     105     143     176     204     217     221
    127          UI     209     184     152     126     105      86      71      58      48      41
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128            UI      35      25      24      16      16      16       7       6       6       6
129            UI       6       6       6       6       0       0       0       0       0       0
130            UI       0       0       0       0       0       0       0       0       0       0
               *

131            KK   CP-E5 COMBINE
132            HC       2   1.044
               *

133            KK      F1   BASIN
134            BA   0.001
135            LG    0.35    0.30    7.94    0.09       0
136            UI       0       9      19       8       2       1       0       0       0       0
137            UI       0       0       0       0       0       0       0       0       0       0
138            UI       0       0       0       0       0       0       0       0       0       0
139            UI       0       0       0       0       0       0       0       0       0       0
140            UI       0       0       0       0       0       0       0       0       0       0
               *

141            KK      G1   BASIN
142            BA   0.007
143            LG    0.35    0.36    5.14    0.26       0
144            UI       0       5      14      28      40      44      40      29      21      15
145            UI      10       8       5       4       3       1       1       1       1       0
146            UI       0       0       0       0       0       0       0       0       0       0
147            UI       0       0       0       0       0       0       0       0       0       0
148            UI       0       0       0       0       0       0       0       0       0       0
               *

149            KK      H1   BASIN
150            BA   0.005
151            LG    0.35    0.36    5.05    0.28       0
152            UI       0       5      20      35      41      34      22      14       9       6
153            UI       4       2       1       1       1       0       0       0       0       0
154            UI       0       0       0       0       0       0       0       0       0       0
155            UI       0       0       0       0       0       0       0       0       0       0
156            UI       0       0       0       0       0       0       0       0       0       0
               *

157            KK      I1   BASIN
158            BA   0.006
159            LG    0.35    0.36    5.05    0.28       0
160            UI       0       4      12      24      33      37      34      26      18      13
161            UI       9       7       5       3       3       1       1       1       1       1
162            UI       0       0       0       0       0       0       0       0       0       0
163            UI       0       0       0       0       0       0       0       0       0       0
164            UI       0       0       0       0       0       0       0       0       0       0
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

165            KK    CLR2 COMBINE
166            HC       4
               *
               *

167            KK      J1   BASIN
168            BA   0.003
169            LG    0.35    0.36    5.14    0.26       0
170            UI       0       3      13      22      25      20      13       8       5       3
171            UI       2       1       1       1       0       0       0       0       0       0
172            UI       0       0       0       0       0       0       0       0       0       0
173            UI       0       0       0       0       0       0       0       0       0       0
174            UI       0       0       0       0       0       0       0       0       0       0
               *

175            KK      K1   BASIN
176            BA   0.020
177            LG    0.35    0.37    5.24    0.26       0
178            UI       0      11      25      55      81     100     106      97      75      57
179            UI      43      32      23      18      13      10       8       6       3       3
180            UI       3       3       3       0       0       0       0       0       0       0
181            UI       0       0       0       0       0       0       0       0       0       0
182            UI       0       0       0       0       0       0       0       0       0       0
               *

183            KK      L1   BASIN
184            BA   0.003
185            LG    0.35    0.36    5.05    0.28       0
186            UI       0       6      23      33      25      14       7       4       2       1
187            UI       1       0       0       0       0       0       0       0       0       0
188            UI       0       0       0       0       0       0       0       0       0       0
189            UI       0       0       0       0       0       0       0       0       0       0
190            UI       0       0       0       0       0       0       0       0       0       0
               *

191            KK      M1   BASIN
192            BA   0.001
193            LG    0.35    0.36    5.05    0.28       0
194            UI       0       3       9      12       7       4       2       1       0       0
195            UI       0       0       0       0       0       0       0       0       0       0
196            UI       0       0       0       0       0       0       0       0       0       0
197            UI       0       0       0       0       0       0       0       0       0       0
198            UI       0       0       0       0       0       0       0       0       0       0
               *
199            ZZ
```

```
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE    (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

   24        A1
              V
              V
   34      R-A1
              .
              .
   39         .        A2
              .         .
              .         .
   47     CP-A2..........
              .
              .
   49         .        B1
              .         .
              .         .
   57         .         .        C1
              .         .         .
              .         .         .
   65         .         .         .        D1
              .         .         .         .
              .         .         .         .
   73         .    CLEAR....................
              .         .
              .         .
   75         .         .        E1
              .         .         .
              .         .         .
   83         .         .         .        E2
              .         .         .         .
              .         .         .         .
   91         .         .         .         .        E3
              .         .         .         .         .
              .         .         .         .         .
   99         .         .         .         .         .        E4
              .         .         .         .         .         .
              .         .         .         .         .         .
  116         .         .     CP-E4..............................
              .         .         V
              .         .         V
  118         .         .    R-CPE4
              .         .         .
              .         .         .
  123         .         .         .        E5
              .         .         .         .
              .         .         .         .
  131         .         .     CP-E5..........
              .         .         .
              .         .         .
  133         .         .         .        F1
              .         .         .         .
              .         .         .         .
  141         .         .         .         .        G1
              .         .         .         .         .
              .         .         .         .         .
  149         .         .         .         .         .        H1
              .         .         .         .         .         .
              .         .         .         .         .         .
  157         .         .         .         .         .         .        I1
              .         .         .         .         .         .         .
              .         .         .         .         .         .         .
  165         .         .         .      CLR2..............................
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              .         .         .         .
  167         .         .         .         .        J1
              .         .         .         .         .
              .         .         .         .         .
  175         .         .         .         .         .        K1
              .         .         .         .         .         .
              .         .         .         .         .         .
  183         .         .         .         .         .         .        L1
              .         .         .         .         .         .         .
              .         .         .         .         .         .         .
  191         .         .         .         .         .         .         .        M1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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```
1*****************************************                                   *****************************************
 *                                       *                                   *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                   *   U.S. ARMY CORPS OF ENGINEERS        *
 *             JUN  1998                 *                                   *   HYDROLOGIC ENGINEERING CENTER       *
 *           VERSION 4.1                 *                                   *         609 SECOND STREET             *
 *                                       *                                   *      DAVIS, CALIFORNIA 95616          *
 * RUN DATE   15JUN16  TIME  20:29:36    *                                   *          (916) 756-1104               *
 *                                       *                                   *                                       *
*****************************************                                   *****************************************



                              Flood Control District of Maricopa County
                              DM19 EX - Desert Mountain 19 Existing Condition
                              100 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: S-Graph
                              Storm: Multiple
                              06/14/2016
                              WOOD/PATEL FILE NAME: DM19EX100.DAT

 10 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     1JAN99  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     2JAN99  ENDING DATE
                     NDTIME       0919  ENDING TIME
                      ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL      .02 HOURS
                       TOTAL TIME BASE    33.32 HOURS

         ENGLISH UNITS
              DRAINAGE AREA           SQUARE MILES
              PRECIPITATION DEPTH     INCHES
              LENGTH, ELEVATION       FEET
              FLOW                    CUBIC FEET PER SECOND
              STORAGE VOLUME          ACRE-FEET
              SURFACE AREA            ACRES
              TEMPERATURE             DEGREES FAHRENHEIT

 12 JD          INDEX STORM NO. 1
                       STRM       3.31  PRECIPITATION DEPTH
                       TRDA        .00  TRANSPOSITION DRAINAGE AREA

 13 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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 16 JD          INDEX STORM NO. 2
                       STRM       3.29  PRECIPITATION DEPTH
                       TRDA        .50  TRANSPOSITION DRAINAGE AREA

 17 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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20 JD INDEX STORM NO. 3

STRM 3.23 PRECIPITATION DEPTH

TRDA 2.80 TRANSPOSITION DRAINAGE AREA

21 PI PRECIPITATION PATTERN

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1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	A1	468.	4.13	38.	10.	7.	.20		
+	ROUTED TO	R-A1	462.	4.18	38.	10.	7.	.20		
+	HYDROGRAPH AT	A2	50.	4.02	3.	1.	0.	.01		
+	2 COMBINED AT	CP-A2	469.	4.17	41.	10.	7.	.21		
+	HYDROGRAPH AT	B1	35.	4.02	2.	0.	0.	.01		
+	HYDROGRAPH AT	C1	26.	4.02	1.	0.	0.	.01		
+	HYDROGRAPH AT	D1	7.	4.02	0.	0.	0.	.00		
+	3 COMBINED AT	CLEAR	67.	4.02	3.	1.	1.	.02		
+	HYDROGRAPH AT	E1	72.	4.02	4.	1.	1.	.02		
+	HYDROGRAPH AT	E2	3.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	E3	111.	4.07	7.	2.	1.	.04		
+	HYDROGRAPH AT	E4	1111.	4.42	165.	41.	30.	.92		
+	4 COMBINED AT	CP-E4	1115.	4.40	174.	44.	31.	.98		
+	ROUTED TO	R-CPE4	1116.	4.40	174.	44.	31.	.98		
+	HYDROGRAPH AT	E5	186.	4.05	11.	3.	2.	.06		
+	2 COMBINED AT	CP-E5	1124.	4.38	183.	46.	33.	1.04		
+	HYDROGRAPH AT	F1	4.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	G1	23.	4.02	1.	0.	0.	.01		
+	HYDROGRAPH AT	H1	17.	4.02	1.	0.	0.	.00		
+	HYDROGRAPH AT	I1	20.	4.02	1.	0.	0.	.01		
+	4 COMBINED AT	CLR2	63.	4.02	3.	1.	1.	.02		
+	HYDROGRAPH AT	J1	10.	4.02	1.	0.	0.	.00		
+	HYDROGRAPH AT	K1	65.	4.02	3.	1.	1.	.02		
+	HYDROGRAPH AT	L1	10.	4.02	1.	0.	0.	.00		
+	HYDROGRAPH AT	M1	3.	4.02	0.	0.	0.	.00		

*** NORMAL END OF HEC-1 ***

APPENDIX B

Developed Condition Hydrologic Calculations

DDMSW Output Data

2-year HEC-1 Model

10-year HEC-1 Model

100-year HEC-1 Model

DDMSW Output Data

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
A1	645	33	64533	0.085	43.00	0.230	-	100	
	645	40	64540	0.083	42.20	0.170	-	100	
	645	93	64593	0.023	11.50	0.330	-	100	
	645	96	64596	0.007	3.30	0.070	-	100	
A2	645	93	64593	0.010	69.20	0.330	-	100	
	645	96	64596	0.005	30.80	0.070	-	100	
B1	645	33	64533	0.022	100.00	0.230	-	100	
B10	645	93	64593	0.012	100.00	0.330	-	100	
B11	645	93	64593	0.009	92.70	0.330	-	100	
	645	34	64534	0.001	7.30	0.230	-	100	
B12	645	6	6456	0.002	49.00	0.620	-	100	
	645	93	64593	0.003	51.00	0.330	-	100	
B13	645	34	64534	0.000	3.40	0.230	-	100	
	645	96	64596	0.003	86.20	0.070	-	100	
	645	6	6456	0.000	10.30	0.620	-	100	
B14	645	6	6456	0.009	22.90	0.620	-	100	
	645	96	64596	0.016	41.60	0.070	-	100	
	645	34	64534	0.011	29.60	0.230	-	100	
	645	33	64533	0.002	5.20	0.230	-	100	
	645	93	64593	0.000	0.80	0.330	-	100	
B14A	645	96	64596	0.003	69.00	0.070	-	100	
	645	6	6456	0.001	31.00	0.620	-	100	
B2	645	33	64533	0.001	100.00	0.230	-	100	
B3	645	33	64533	0.038	100.00	0.230	-	100	
B4	645	6	6456	0.043	4.60	0.620	-	100	
	645	33	64533	0.712	77.30	0.230	-	100	
	645	34	64534	0.004	0.50	0.230	-	100	
	645	40	64540	0.014	1.50	0.170	-	100	
	645	63	64563	0.079	8.60	0.140	25.00	100	
	645	96	64596	0.069	7.50	0.070	-	100	
B5	645	34	64534	0.006	100.00	0.230	-	100	
B6	645	6	6456	0.002	20.90	0.620	-	100	
	645	33	64533	0.005	54.70	0.230	-	100	
	645	93	64593	0.002	24.40	0.330	-	100	
B6W	645	93	64593	0.000	3.30	0.330	-	100	
	645	33	64533	0.000	3.30	0.230	-	100	
	645	6	6456	0.003	93.30	0.620	-	100	
B8	645	33	64533	0.008	75.90	0.230	-	100	
	645	93	64593	0.002	22.20	0.330	-	100	
	645	6	6456	0.000	1.90	0.620	-	100	
B9	645	93	64593	0.008	100.00	0.330	-	100	
C1	645	33	64533	0.001	3.10	0.230	-	100	
	645	34	64534	0.022	94.70	0.230	-	100	
	645	96	64596	0.001	2.20	0.070	-	100	
L1	645	33	64533	0.003	100.00	0.230	-	100	
M1	645	33	64533	0.002	100.00	0.230	-	100	

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn	Description
Major Basin ID: 01									
A1	901	0.0181	9.2	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
	902	0.1792	90.8	0.30	5	30.0	NORMAL	0.040	Rural (1 dwelling unit per acre or less)
		0.1973	**100.0**						
A2	900	0.0110	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0110	**100.0**						
B1	900	0.0018	8.3	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
	901	0.0045	20.7	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
	902	0.0154	71.0	0.30	5	30.0	NORMAL	0.040	Rural (1 dwelling unit per acre or less)
		0.0217	**100.0**						
B10	110	0.0010	8.3	0.30	5	30.0	NORMAL	0.020	Rural Residential (<= 1/5 du per acre)
	150	0.0010	8.3	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	901	0.0100	83.3	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
		0.0120	**99.9**						
B11	150	0.0080	80.0	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	600	0.0020	20.0	0.05	95	0.0	DRY	0.015	General Transportation (Transportation where no detail avail
		0.0100	**100.0**						
B12	730	0.0050	100.0	0.10	0	90.0	NORMAL	0.030	Passive Open Space (Includes mountain preserves and washes)
		0.0050	**100.0**						
B13	150	0.0004	13.3	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	600	0.0015	50.0	0.05	95	0.0	DRY	0.015	General Transportation (Transportation where no detail avail
	901	0.0011	36.7	0.20	0	75.0	NORMAL	0.030	Recreational Open Space

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn	Description

Major Basin ID: 01

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn	Description
		0.0030	**100.0**						
B14	150	0.0070	17.9	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	230	0.0040	10.3	0.10	80	30.0	NORMAL	0.020	Community Commercial (100,000 to 500,000 sq. ft.)
	600	0.0040	10.3	0.05	95	0.0	DRY	0.015	General Transportation (Transportation where no detail avail
	901	0.0240	61.5	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
		0.0390	**100.0**						
B14A	150	0.0040	80.0	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	600	0.0010	20.0	0.05	95	0.0	DRY	0.015	General Transportation (Transportation where no detail avail
		0.0050	**100.0**						
B2	900	0.0012	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0012	**100.0**						
B3	900	0.0038	10.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
	901	0.0057	15.0	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
	902	0.0285	75.0	0.30	5	30.0	NORMAL	0.040	Rural (1 dwelling unit per acre or less)
		0.0380	**100.0**						
B4	130	0.0074	0.8	0.18	15	35.0	NORMAL	0.040	Large Lot Residential - Single Family (1 du per acre to 2 du
	150	0.0250	2.7	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	220	0.0067	0.7	0.07	80	10.0	NORMAL	0.020	Neighborhood Retail Center
	900	0.1237	13.5	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
	901	0.2047	22.3	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
	902	0.5446	59.3	0.30	5	30.0	NORMAL	0.040	Rural (1 dwelling unit per acre or less)

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn	Description
Major Basin ID: 01									
B4	903	0.0066	0.7	0.20	0	35.0	NORMAL	0.050	Dedicated Open Space
		0.9187	**100.0**						
B5	900	0.0010	16.7	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
	901	0.0050	83.3	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
		0.0060	**100.0**						
B6	600	0.0003	3.4	0.05	95	0.0	DRY	0.015	General Transportation (Transportation where no detail avail
	730	0.0001	1.1	0.10	0	90.0	NORMAL	0.030	Passive Open Space (Includes mountain preserves and washes)
	901	0.0083	95.4	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
		0.0087	**99.9**						
B6W	600	0.0002	6.5	0.05	95	0.0	DRY	0.015	General Transportation (Transportation where no detail avail
	730	0.0019	61.3	0.10	0	90.0	NORMAL	0.030	Passive Open Space (Includes mountain preserves and washes)
	901	0.0010	32.3	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
		0.0031	**100.1**						
B8	150	0.0090	81.8	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	600	0.0020	18.2	0.05	95	0.0	DRY	0.015	General Transportation (Transportation where no detail avail
		0.0110	**100.0**						
B9	150	0.0060	75.0	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	600	0.0020	25.0	0.05	95	0.0	DRY	0.015	General Transportation (Transportation where no detail avail
		0.0080	**100.0**						
C1	150	0.0060	25.0	0.15	25	30.0	NORMAL	0.040	Small Lot Residential - (2-5 dwelling units per acre)
	600	0.0020	8.3	0.05	95	0.0	DRY	0.015	General Transportation (Transportation where no detail avail

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn	Description
Major Basin ID: 01									
C1	901	0.0160	66.7	0.20	0	75.0	NORMAL	0.030	Recreational Open Space
		0.0240	**100.0**						
L1	900	0.0027	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0027	**100.0**						
M1	900	0.0015	100.0	0.35	0	30.0	DRY	0.040	Vacant (Existing land use database only)
		0.0015	**100.0**						

Area ID	Sub Basin Parameters Area (sq mi)	Length (mi)	Slope (ft/mi)	S-Graph	Lca (mi)	Lag (min)	Velocity (f/s)	Kn	Rainfall Losses IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)
Major Basin ID: 01													
B14A	0.004	0.04	394.7	VALLEY	0.02	1.10	3.17	0.035	0.13	0.26	6.16	0.160	39
A1	0.197	0.95	134.1	DESERT/RANGE	0.51	16.80	4.96	0.039	0.29	0.25	5.34	0.258	5
B6W	0.003	0.17	126.5	VALLEY	0.08	3.20	4.53	0.029	0.13	0.28	3.37	1.041	6
A2	0.011	0.19	118.3	DESERT/RANGE	0.10	5.10	3.20	0.040	0.35	0.37	5.24	0.250	
B5	0.006	0.11	136.4	VALLEY	0.06	2.70	3.60	0.032	0.23	0.27	5.05	0.377	
B6	0.009	0.11	133.9	VALLEY	0.06	2.50	4.01	0.029	0.19	0.25	4.45	0.524	3
B8	0.010	0.18	61.5	VALLEY	0.09	4.80	3.28	0.035	0.13	0.27	4.87	0.295	38
B1	0.022	0.31	184.7	DESERT/RANGE	0.15	6.40	4.35	0.038	0.28	0.26	5.05	0.306	4
B9	0.008	0.08	144.6	VALLEY	0.04	2.20	3.36	0.034	0.13	0.28	4.33	0.376	43
B2	0.001	0.05	297.9	DESERT/RANGE	0.02	1.40	3.00	0.040	0.35	0.36	5.05	0.281	
B10	0.012	0.22	113.6	VALLEY	0.11	4.30	4.53	0.030	0.20	0.25	4.33	0.541	2
B3	0.038	0.57	146.3	DESERT/RANGE	0.25	10.40	4.85	0.039	0.29	0.26	5.05	0.299	4
B11	0.010	0.18	107.3	VALLEY	0.09	4.30	3.62	0.035	0.13	0.27	4.39	0.374	39
B4	0.921	3.33	259.5	DESERT/RANGE	1.69	36.70	7.99	0.038	0.28	0.27	5.24	0.281	6
B12	0.005	0.13	150.4	DESERT/RANGE	0.07	2.80	4.15	0.030	0.10	0.25	3.79	0.851	
B13	0.003	0.05	408.2	VALLEY	0.02	.80	5.44	0.024	0.12	0.24	7.27	0.114	51
B14	0.038	0.33	121.2	VALLEY	0.16	5.50	5.29	0.029	0.17	0.26	5.58	0.266	23
C1	0.023	0.30	82.5	VALLEY	0.15	6.00	4.47	0.031	0.18	0.26	5.05	0.344	14
L1	0.003	0.12	243.7	DESERT/RANGE	0.05	2.90	3.62	0.040	0.35	0.36	5.05	0.281	
M1	0.001	0.10	204.1	DESERT/RANGE	0.04	2.60	3.38	0.040	0.35	0.36	5.05	0.281	

2-year HEC-1 Model

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1*****************************************                                        ***************************************
 *                                       *                                        *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                        *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN  1998                 *                                        *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                                        *         609 SECOND STREET           *
 *                                       *                                        *     DAVIS, CALIFORNIA 95616         *
 * RUN DATE   15JUN16  TIME  20:59:37    *                                        *         (916) 756-1104              *
 *                                       *                                        *                                     *
*****************************************                                        ***************************************


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


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                         HEC-1 INPUT                                                   PAGE  1

          LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1         ID        Flood Control District of Maricopa County
            2         ID        DM19 PROP - Desert Mountain 19 Post Online Det Basins 1st Flush
            3         ID        2 YEAR
            4         ID        6 Hour  Storm
            5         ID        Unit Hydrograph: S-Graph
            6         ID        Storm: Multiple
            7         ID        06/14/2016
            8         ID        WOOD/PATEL FILE NAME: DM19FT2.DAT
                      *DIAGRAM
            9         IT       1  1JAN99       0    2000
           10         IO       5
           11         IN      15
                      *
           12         JD   1.475  0.0001
           13         PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           14         PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           15         PC   0.962   0.972   0.983   0.991   1.000
           16         JD   1.466  0.5000
           17         PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           18         PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           19         PC   0.962   0.972   0.983   0.991   1.000
           20         JD   1.456     1.0
           21         PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.075
           22         PC   0.087   0.099   0.119   0.148   0.230   0.407   0.778   0.881   0.919   0.945
           23         PC   0.957   0.968   0.980   0.990   1.000
           24         JD   1.438     2.8
           25         PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
           26         PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
           27         PC   0.950   0.963   0.975   0.988   1.000
                      *

           28         KK      A1   BASIN
           29         BA   0.197
           30         LG    0.29    0.25    5.34    0.26       5
           31         UI       0      39      39      39      50     114     146     182     223     254
           32         UI     279     323     344     355     374     378     378     369     357     338
           33         UI     302     275     245     222     200     181     164     147     133     120
           34         UI     108      94      88      75      74      62      61      53      42      42
           35         UI      42      31      27      27      27      27      25      10      10      10
           36         UI      10      10      10      10      10      10      10      10      10      10
           37         UI      10      10       0       0       0       0       0       0       0       0
                      *

           38         KK    R-A1   ROUTE
           39         RS       4    FLOW
           40         RC   0.060   0.040   0.060     980  0.0224   19.00
           41         RX    0.00   42.00   73.00  106.00  196.00  225.00  251.00  295.00
           42         RY   20.00   15.00   10.00    7.00    6.00    5.00   13.00   19.00
                      *
1                                         HEC-1 INPUT                                                   PAGE  2

          LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           43         KK      A2   BASIN
           44         BA   0.011
           45         LG    0.35    0.37    5.24    0.25       0
           46         UI       0       7      22      45      62      70      63      46      33      23
           47         UI      16      12       8       6       5       2       2       2       2       0
           48         UI       0       0       0       0       0       0       0       0       0       0
           49         UI       0       0       0       0       0       0       0       0       0       0
           50         UI       0       0       0       0       0       0       0       0       0       0
                      *

           51         KK   CP-A2 COMBINE
           52         HC       2
                      *
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 53           KK     B1   BASIN
 54           BA  0.022
 55           LG   0.28    0.26    5.05    0.31       4
 56           UI      0      12      23      55      81     101     111     106      88      66
 57           UI     51      39      29      23      17      12       9       8       5       3
 58           UI      3       3       3       3       0       0       0       0       0       0
 59           UI      0       0       0       0       0       0       0       0       0       0
 60           UI      0       0       0       0       0       0       0       0       0       0
              *

 61           KK   R-B1   ROUTE
 62           RK    500  0.0200   0.013            CIRC   3.500
              *

 63           KK     B2   BASIN
 64           BA  0.001
 65           LG   0.35    0.36    5.05    0.28       0
 66           UI      0      10      19       7       2       1       0       0       0       0
 67           UI      0       0       0       0       0       0       0       0       0       0
 68           UI      0       0       0       0       0       0       0       0       0       0
 69           UI      0       0       0       0       0       0       0       0       0       0
 70           UI      0       0       0       0       0       0       0       0       0       0
              *

 71           KK     B3   BASIN
 72           BA  0.038
 73           LG   0.29    0.26    5.05    0.30       4
 74           UI      0      12      12      26      47      66      83      99     110     117
 75           UI    118     113     105      88      74      63      54      45      38      32
 76           UI     27      23      19      17      13      13       8       8       8       5
 77           UI      3       3       3       3       3       3       3       3       3       0
 78           UI      0       0       0       0       0       0       0       0       0       0
              *

 79           KK  CP-B3 COMBINE
 80           HC      2
              *
1                                          HEC-1 INPUT                                          PAGE  3

      LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 81           KK R-CPB3   ROUTE
 82           RS      2    FLOW
 83           RC  0.060   0.040   0.060     300  0.0100   10.00
 84           RX   0.00    7.50   15.00   18.00   21.00   23.00   30.50   38.00
 85           RY  10.00    7.50    5.00    5.00    5.00    5.00    7.50   10.00
              *

 86           KK     B4   BASIN
 87           BA  0.921
 88           LG   0.28    0.27    5.24    0.28       6
 89           UI      0      84      84      84      84      84      84      84      84     173
 90           UI    243     243     297     329     364     405     445     470     511     545
 91           UI    580     602     598     694     695     721     747     752     771     764
 92           UI    810     810     810     810     810     810     803     777     766     760
 93           UI    748     720     694     650     614     589     589     531     511     494
 94           UI    463     445     432     399     393     367     360     329     329     299
 95           UI    299     274     259     259     235     231     231     198     189     189
 96           UI    188     159     159     159     159     143     130     130     130     130
 97           UI    128      90      90      90      90      90      90      90      87      58
 98           UI     58      58      58      58      58      58      58      58      58      58
 99           UI     58      30      21      21      21      21      21      21      21      21
100           UI     21      21      21      21      21      21      21      21      21      21
101           UI     21      21      21      21      21      21      21      21      21      21
102           UI     21      21      21      21      21       0       0       0       0       0
              *

103           KK   DVOC  DIVERT
104           DT   DTOC    0.00  1050.0
105           DI    0.0  2000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
106           DQ    0.0  2000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

107           KK  DETOC STORAGE
108           KO
109           RS      1    STOR
110           SV           0.26    0.59    0.99    1.48
111           SQ           4.00    9.00   12.00   15.00
112           SE           1.00    2.00    3.00    4.00
              *

113           KK   DVOCRETRIEVE
114           DR   DTOC
              *

115           KK    B4C COMBINE
116           HC      2
              *

117           KK   DVOD  DIVERT
118           DT   DTOD    0.00   975.0
119           DI    0.0 20000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
120           DQ    0.0 20000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
1                                          HEC-1 INPUT                                          PAGE  4

      LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


121           KK  DETOD STORAGE
122           KO
123           RS      1    STOR
124           SV           0.42    0.89    1.42    2.01
```

```
 125          SQ            4.00    9.00   12.00   15.00
 126          SE            1.00    2.00    3.00    4.00
              *

 127          KK    DVODRETRIEVE
 128          DR    DTOD
              *

 129          KK      B4D COMBINE
 130          HC        2
              *

 131          KK    CP-B4 COMBINE
 132          HC        2
              *

 133          KK   R-CPB4   ROUTE
 134          RS        1    FLOW
 135          RC    0.060   0.040   0.060     300  0.0300 2631.00
 136          RX     0.00   18.90   43.80   54.80   81.50   91.60  120.00  160.00
 137          RY   2635.0 2630.00 2629.00 2625.00 2625.00 2629.00 2630.00 2631.00
              *

 138          KK    CP-B5 COMBINE
 139          HC        2
              *

 140          KK   R-CPB5   ROUTE
 141          RS        2    FLOW
 142          RC    0.060   0.040   0.060     650  0.0300 2631.00
 143          RX     0.00   18.90   43.80   54.80   81.50   91.60  120.00  160.00
 144          RY   2635.0 2630.00 2629.00 2625.00 2625.00 2629.00 2630.00 2631.00
              *

 145          KK       B6   BASIN
 146          BA    0.009
 147          LG     0.19    0.25    4.45    0.52       3
 148          UI        0      26      78     129      74      27       9       4       0       0
 149          UI        0       0       0       0       0       0       0       0       0       0
 150          UI        0       0       0       0       0       0       0       0       0       0
 151          UI        0       0       0       0       0       0       0       0       0       0
 152          UI        0       0       0       0       0       0       0       0       0       0
              *

 153          KK       B8   BASIN
 154          BA    0.010
 155          LG     0.13    0.27    4.87    0.30      38
 156          UI        0       7      25      39      55      83      63      46      31      15
 157          UI       10       6       2       2       2       0       0       0       0       0
 158          UI        0       0       0       0       0       0       0       0       0       0
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 159          UI        0       0       0       0       0       0       0       0       0       0
 160          UI        0       0       0       0       0       0       0       0       0       0
              *

 161          KK     CP68 COMBINE
 162          HC        2
              *

 163          KK    DET68 STORAGE
 164          KO
 165          RS        1    STOR
 166          SV            0.09    0.21    0.37    0.58
 167          SQ            1.00    1.00    2.00    2.00
 168          SE   2608.0 2609.00 2610.00 2611.00 2612.00
 169          SS   2612.0   20.00    2.80    1.50
              *

 170          KK      B6W   BASIN
 171          BA    0.003
 172          LG     0.13    0.28    3.37    1.04       6
 173          UI        0       5      16      29      32      19       9       4       1       1
 174          UI        0       0       0       0       0       0       0       0       0       0
 175          UI        0       0       0       0       0       0       0       0       0       0
 176          UI        0       0       0       0       0       0       0       0       0       0
 177          UI        0       0       0       0       0       0       0       0       0       0
              *

 178          KK    CP-6W COMBINE
 179          HC        3
              *

 180          KK    DV-B7  DIVERT
 181          DT    DT-B7    0.00     0.0
 182          DI      0.0   150.0   300.0   450.0   600.0   750.0   900.0  1050.0  1200.0     0.0
 183          DQ      0.0     4.0     9.0    12.0    15.0    18.0    20.0    22.0    24.0     0.0
              *

 184          KK    DV-B7RETRIEVE
 185          DR    DT-B7
              *

 186          KK     B14A   BASIN
 187          BA    0.004
 188          LG     0.13    0.26    6.16    0.16      39
 189          UI        0      62      83       9       0       0       0       0       0       0
 190          UI        0       0       0       0       0       0       0       0       0       0
 191          UI        0       0       0       0       0       0       0       0       0       0
 192          UI        0       0       0       0       0       0       0       0       0       0
 193          UI        0       0       0       0       0       0       0       0       0       0
              *
```

```
LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 194           KK   CP-V7 COMBINE
 195           HC       2
               *

 196           KK  DETBV7 STORAGE
 197           KO
 198           RS       1    STOR
 199           SV            0.22    0.47    0.77    1.10
 200           SQ            1.00    1.00    2.00   50.00
 201           SE  2606.0 2607.00 2608.00 2609.00 2610.00
               *

 202           KK      B9   BASIN
 203           BA   0.008
 204           LG    0.13    0.28    4.33    0.38      43
 205           UI       0      31      93     116      50      15       4       0       0       0
 206           UI       0       0       0       0       0       0       0       0       0       0
 207           UI       0       0       0       0       0       0       0       0       0       0
 208           UI       0       0       0       0       0       0       0       0       0       0
 209           UI       0       0       0       0       0       0       0       0       0       0
               *

 210           KK   DV-B9  DIVERT
 211           DT   DT-B9    0.21     0.0
 212           DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 213           DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               *

 214           KK   CP-B9 COMBINE
 215           HC       3
               *

 216           KK  R-CPB9   ROUTE
 217           RS       1    FLOW
 218           RC   0.060   0.040   0.060     750  0.0300 2605.00
 219           RX    0.00   55.30  123.80  129.00  141.80  146.00  155.20  188.60
 220           RY  2608.0 2600.00 2598.00 2596.00 2596.00 2597.80 2598.00 2605.00
               *

 221           KK     B10   BASIN
 222           BA   0.012
 223           LG    0.20    0.25    4.33    0.54       2
 224           UI       0      10      39      58      90     102      69      47      23      13
 225           UI       7       3       3       0       0       0       0       0       0       0
 226           UI       0       0       0       0       0       0       0       0       0       0
 227           UI       0       0       0       0       0       0       0       0       0       0
 228           UI       0       0       0       0       0       0       0       0       0       0
               *
```



```
LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 229           KK  DV-B10  DIVERT
 230           DT  DT-B10    0.32     0.0
 231           DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 232           DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               *

 233           KK     B12   BASIN
 234           BA   0.005
 235           LG    0.10    0.25    3.79    0.85       0
 236           UI       0      11      41      56      40      22      12       6       3       1
 237           UI       1       0       0       0       0       0       0       0       0       0
 238           UI       0       0       0       0       0       0       0       0       0       0
 239           UI       0       0       0       0       0       0       0       0       0       0
 240           UI       0       0       0       0       0       0       0       0       0       0
               *

 241           KK     B14   BASIN
 242           BA   0.038
 243           LG    0.17    0.26    5.58    0.27      23
 244           UI       0      23      67     119     155     222     274     198     149     108
 245           UI      58      39      24      12       7       7       7       0       0       0
 246           UI       0       0       0       0       0       0       0       0       0       0
 247           UI       0       0       0       0       0       0       0       0       0       0
 248           UI       0       0       0       0       0       0       0       0       0       0
               *

 249           KK  DV-B14  DIVERT
 250           DT  DT-B14    1.03     0.0
 251           DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 252           DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               *

 253           KK  CP-B14 COMBINE
 254           HC       4
               *

 255           KK      C1   BASIN
 256           BA   0.023
 257           LG    0.18    0.26    5.05    0.34      14
 258           UI       0      13      33      61      79     104     155     128      99      76
 259           UI      55      29      22      13       8       4       4       4       0       0
 260           UI       0       0       0       0       0       0       0       0       0       0
 261           UI       0       0       0       0       0       0       0       0       0       0
 262           UI       0       0       0       0       0       0       0       0       0       0
               *

 263           KK   DV-C1  DIVERT
 264           DT   DT-C1    0.61     0.0
```

```
265          DI      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
266          DQ      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


267          KK    DVC-K  DIVERT
268          DT    DTC-K    0.00       1
269          DI      0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
270          DQ      0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

271          KK    DVC-H  DIVERT
272          DT    DTC-H    0.00       4
273          DI      0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
274          DQ      0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

275          KK      B13   BASIN
276          BA    0.003
277          LG     0.12    0.24    7.27    0.11      51
278          UI        0      82      33       0       0       0       0       0       0       0
279          UI        0       0       0       0       0       0       0       0       0       0
280          UI        0       0       0       0       0       0       0       0       0       0
281          UI        0       0       0       0       0       0       0       0       0       0
282          UI        0       0       0       0       0       0       0       0       0       0
             *

283          KK   DV-B13  DIVERT
284          DT   DT-B13    0.08     0.0
285          DI      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
286          DQ      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

287          KK    CPB13 COMBINE
288          HC        2
             *

289          KK     DVGF  DIVERT
290          DT     DVGF    0.00       1
291          DI      0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
292          DQ      0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

293          KK    R-B13   ROUTE
294          RK      450  0.0090   0.013            CIRC   4.000
             *

295          KK    CPGAL COMBINE
296          HC        2
             *

297          KK       B5   BASIN
298          BA    0.006
299          LG     0.23    0.27    5.05    0.38       0
300          UI        0      15      45      80      54      25      10       2       2       0
301          UI        0       0       0       0       0       0       0       0       0       0
302          UI        0       0       0       0       0       0       0       0       0       0
303          UI        0       0       0       0       0       0       0       0       0       0
304          UI        0       0       0       0       0       0       0       0       0       0
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


305          KK    DV-B5  DIVERT
306          DT    DT-B5    0.55     0.0
307          DI      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
308          DQ      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

309          KK      B11   BASIN
310          BA    0.010
311          LG     0.13    0.27    4.39    0.37      39
312          UI        0       8      32      48      75      85      57      39      19      11
313          UI        6       2       2       0       0       0       0       0       0       0
314          UI        0       0       0       0       0       0       0       0       0       0
315          UI        0       0       0       0       0       0       0       0       0       0
316          UI        0       0       0       0       0       0       0       0       0       0
             *

317          KK   DV-C11  DIVERT
318          DT   DT-C11     0.0     5.0
319          DI      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
320          DQ      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

321          KK   DV-B11  DIVERT
322          DT   DT-B11    0.26     0.0
323          DI      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
324          DQ      0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *
             *

325          KK       L1   BASIN
326          BA    0.003
327          LG     0.35    0.36    5.05    0.28       0
328          UI        0       6      23      33      25      14       7       4       2       1
329          UI        1       0       0       0       0       0       0       0       0       0
330          UI        0       0       0       0       0       0       0       0       0       0
331          UI        0       0       0       0       0       0       0       0       0       0
332          UI        0       0       0       0       0       0       0       0       0       0
```

```
              *

333           KK     M1   BASIN
334           BA  0.001
335           LG   0.35    0.36    5.05    0.28       0
336           UI      0       3       9      12       7       4       2       1       0       0
337           UI      0       0       0       0       0       0       0       0       0       0
338           UI      0       0       0       0       0       0       0       0       0       0
339           UI      0       0       0       0       0       0       0       0       0       0
340           UI      0       0       0       0       0       0       0       0       0       0
              *
341           ZZ
```

```
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE    (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

   NO.    (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

   28        A1
              V
              V
   38      R-A1
              .
              .
   43         .        A2
              .         .
              .         .
   51     CP-A2..........
              .
              .
   53         .        B1
              .         V
              .         V
   61         .      R-B1
              .         .
              .         .
   63         .         .        B2
              .         .         .
              .         .         .
   71         .         .         .        B3
              .         .         .         .
              .         .         .         .
   79         .         .    CP-B3..........
              .         .         V
              .         .         V
   81         .         .    R-CPB3
              .         .         .
              .         .         .
   86         .         .         .        B4
              .         .         .         .
              .         .         .         .
  104         .         .         .         .------->   DTOC
  103         .         .         .      DVOC
              .         .         .         V
              .         .         .         V
  107         .         .         .     DETOC
              .         .         .         .
              .         .         .         .
  114         .         .         .         .         .<-------   DTOC
  113         .         .         .         .      DVOC
              .         .         .         .         .
              .         .         .         .         .
  115         .         .         .       B4C..........
              .         .         .         .
              .         .         .         .
  118         .         .         .         .------->   DTOD
  117         .         .         .      DVOD
              .         .         .         V
              .         .         .         V
  121         .         .         .     DETOD
              .         .         .         .
              .         .         .         .
  128         .         .         .         .         .<-------   DTOD
  127         .         .         .         .      DVOD
              .         .         .         .         .
              .         .         .         .         .
  129         .         .         .       B4D..........
              .         .         .         .
              .         .         .         .
  131         .         .    CP-B4..........
              .         .         V
              .         .         V
  133         .         .    R-CPB4
              .         .         .
              .         .         .
  138         .     CP-B5..........
              .         V
              .         V
  140         .    R-CPB5
              .         .
              .         .
  145         .         .        B6
              .         .         .
              .         .         .
  153         .         .         .        B8
              .         .         .         .
              .         .         .         .
  161         .         .      CP68..........
              .         .         V
              .         .         V
  163         .         .     DET68
              .         .         .
              .         .         .
  170         .         .         .       B6W
              .         .         .         .
              .         .         .         .
  178         .     CP-6W....................
              .         .
              .         .
  181         .         .------->   DT-B7
  180         .     DV-B7
              .         .
              .         .
  185         .         .         .<-------   DT-B7
  184         .         .     DV-B7
              .         .         .
```

```
186           .           .           .        B14A

194           .           .       CP-V7............
                                      V
                                      V
196           .           .      DETBV7

202           .           .           .          B9

211           .           .           .           .------->  DT-B9
210           .           .           .       DV-B9

214           .       CP-B9........................
                          V
                          V
216           .      R-CPB9

221           .           .         B10

230           .           .           .------->  DT-B10
229           .           .      DV-B10

233           .           .           .         B12

241           .           .           .           .         B14

250           .           .           .           .           .------->  DT-B14
249           .           .           .           .      DV-B14

253           .      CP-B14....................................

255           .           .          C1

264           .           .           .------->  DT-C1
263           .           .       DV-C1

268           .           .           .------->  DTC-K
267           .           .       DVC-K

272           .           .           .------->  DTC-H
271           .           .       DVC-H

275           .           .           .         B13

284           .           .           .           .------->  DT-B13
283           .           .           .      DV-B13

287           .           .       CPB13............

290           .           .           .------->  DVGF
289           .           .        DVGF
                                      V
                                      V
293           .           .       R-B13

295           .       CPGAL............

297           .           .          B5

306           .           .           .------->  DT-B5
305           .           .       DV-B5

309           .           .           .         B11

318           .           .           .           .------->  DT-C11
317           .           .           .      DV-C11

322           .           .           .           .------->  DT-B11
321           .           .           .      DV-B11

325           .           .           .           .          L1

333           .           .           .           .           .          M1
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                                  ****************************************
*                                        *                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
*             JUN  1998                  *                                  *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                  *                                  *         609 SECOND STREET            *
*                                        *                                  *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   15JUN16  TIME  20:59:37    *                                  *          (916) 756-1104              *
*                                        *                                  *                                      *
*****************************************                                  ****************************************
```

```
                              Flood Control District of Maricopa County
                              DM19 PROP - Desert Mountain 19 Post Online Det Basins 1st Flush
                              2 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: S-Graph
                              Storm: Multiple
                              06/14/2016
                              WOOD/PATEL FILE NAME: DM19FT2.DAT

   10 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT           HYDROGRAPH TIME DATA
                         NMIN          1  MINUTES IN COMPUTATION INTERVAL
                        IDATE     1JAN99  STARTING DATE
                        ITIME       0000  STARTING TIME
                           NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE     2JAN99  ENDING DATE
                       NDTIME       0919  ENDING TIME
                        ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL      .02 HOURS
                       TOTAL TIME BASE    33.32 HOURS

           ENGLISH UNITS
                DRAINAGE AREA           SQUARE MILES
                PRECIPITATION DEPTH     INCHES
                LENGTH, ELEVATION       FEET
                FLOW                    CUBIC FEET PER SECOND
                STORAGE VOLUME          ACRE-FEET
                SURFACE AREA            ACRES
                TEMPERATURE             DEGREES FAHRENHEIT

   12 JD          INDEX STORM NO. 1
                         STRM       1.48  PRECIPITATION DEPTH
                         TRDA        .00  TRANSPOSITION DRAINAGE AREA

   13 PI            PRECIPITATION PATTERN
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.03	.03	.03	.03	.03
.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

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   16 JD          INDEX STORM NO. 2
                         STRM       1.47  PRECIPITATION DEPTH
                         TRDA        .50  TRANSPOSITION DRAINAGE AREA

   17 PI            PRECIPITATION PATTERN
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
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20 JD INDEX STORM NO. 3

STRM 1.46 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

21 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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24 JD INDEX STORM NO. 4

STRM 1.44 PRECIPITATION DEPTH

TRDA 2.80 TRANSPOSITION DRAINAGE AREA

25 PI PRECIPITATION PATTERN

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            **************
            *            *
 107 KK     *    DETOC   *     STORAGE
            *            *
            **************

 108 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


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

            **************
            *            *
 121 KK     *    DETOD   *     STORAGE
            *            *
            **************

 122 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


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

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            *            *
 163 KK     *    DET68   *     STORAGE
            *            *
            **************

 164 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


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

            **************
            *            *
 196 KK     *   DETBV7   *     STORAGE
            *            *
            **************

 197 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	A1	131.	4.15	9.	2.	2.	.20		
+	ROUTED TO	R-A1	128.	4.22	9.	2.	2.	.20		
+	HYDROGRAPH AT	A2	10.	4.03	0.	0.	0.	.01		
+	2 COMBINED AT	CP-A2	128.	4.22	10.	2.	2.	.21		
+	HYDROGRAPH AT	B1	21.	4.03	1.	0.	0.	.02		
+	ROUTED TO	R-B1	21.	4.05	1.	0.	0.	.02		
+	HYDROGRAPH AT	B2	1.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	B3	31.	4.08	2.	0.	0.	.04		
+	2 COMBINED AT	CP-B3	31.	4.07	2.	0.	0.	.04		
+	ROUTED TO	R-CPB3	31.	4.10	2.	0.	0.	.04		
+	HYDROGRAPH AT	B4	236.	4.43	33.	8.	6.	.92		
+	DIVERSION TO	DTOC	236.	4.43	33.	8.	6.	.92		
+	HYDROGRAPH AT	DVOC	0.	.00	0.	0.	0.	.92		
+	ROUTED TO	DETOC	0.	.00	0.	0.	0.	.92		
+	HYDROGRAPH AT	DVOC	236.	4.43	33.	8.	6.	.92		
+	2 COMBINED AT	B4C	236.	4.43	33.	8.	6.	.92		
+	DIVERSION TO	DTOD	236.	4.43	33.	8.	6.	.92		
+	HYDROGRAPH AT	DVOD	0.	.00	0.	0.	0.	.92		
+	ROUTED TO	DETOD	0.	.00	0.	0.	0.	.92		
+	HYDROGRAPH AT	DVOD	236.	4.43	33.	8.	6.	.92		
+	2 COMBINED AT	B4D	236.	4.43	33.	8.	6.	.92		
+	2 COMBINED AT	CP-B4	234.	4.43	34.	8.	6.	.96		
+	ROUTED TO	R-CPB4	233.	4.43	34.	8.	6.	.96		
+	2 COMBINED AT	CP-B5	231.	4.43	34.	9.	6.	.98		
+	ROUTED TO	R-CPB5	230.	4.47	34.	9.	6.	.98		
+	HYDROGRAPH AT	B6	8.	4.02	0.	0.	0.	.01		
+	HYDROGRAPH AT	B8	13.	4.02	1.	0.	0.	.01		
+	2 COMBINED AT	CP68	21.	4.02	1.	0.	0.	.02		
+	ROUTED TO	DET68	2.	4.03	1.	0.	0.	.02		
+	HYDROGRAPH AT	B6W	1.	4.03	0.	0.	0.	.00		
+	3 COMBINED AT	CP-6W	230.	4.47	35.	9.	6.	1.00		
+	DIVERSION TO	DT-B7	7.	4.47	1.	0.	0.	1.00		

+	HYDROGRAPH AT	DV-B7	223.	4.47	34.	8.	6.	1.00
+	HYDROGRAPH AT	DV-B7	7.	4.47	1.	0.	0.	1.00
+	HYDROGRAPH AT	B14A	6.	4.02	0.	0.	0.	.00
+	2 COMBINED AT	CP-V7	10.	4.45	2.	0.	0.	.00
+	ROUTED TO	DETBV7	2.	5.22	1.	0.	0.	.00
+	HYDROGRAPH AT	B9	11.	4.02	1.	0.	0.	.01
+	DIVERSION TO	DT-B9	10.	3.92	0.	0.	0.	.01
+	HYDROGRAPH AT	DV-B9	11.	4.02	0.	0.	0.	.01
+	3 COMBINED AT	CP-B9	223.	4.47	34.	9.	6.	1.02
+	ROUTED TO	R-CPB9	222.	4.48	34.	9.	6.	1.02
+	HYDROGRAPH AT	B10	10.	4.03	0.	0.	0.	.01
+	DIVERSION TO	DT-B10	10.	4.03	0.	0.	0.	.01
+	HYDROGRAPH AT	DV-B10	0.	.00	0.	0.	0.	.01
+	HYDROGRAPH AT	B12	3.	4.02	0.	0.	0.	.00
+	HYDROGRAPH AT	B14	47.	4.02	3.	1.	0.	.04
+	DIVERSION TO	DT-B14	47.	4.02	2.	1.	0.	.04
+	HYDROGRAPH AT	DV-B14	37.	4.08	1.	0.	0.	.04
+	4 COMBINED AT	CP-B14	222.	4.48	34.	9.	6.	1.07
+	HYDROGRAPH AT	C1	25.	4.03	1.	0.	0.	.02
+	DIVERSION TO	DT-C1	25.	4.03	1.	0.	0.	.02
+	HYDROGRAPH AT	DV-C1	1.	4.30	0.	0.	0.	.02
+	DIVERSION TO	DTC-K	1.	4.30	0.	0.	0.	.02
+	HYDROGRAPH AT	DVC-K	0.	4.23	0.	0.	0.	.02
+	DIVERSION TO	DTC-H	0.	4.23	0.	0.	0.	.02
+	HYDROGRAPH AT	DVC-H	0.	.00	0.	0.	0.	.02
+	HYDROGRAPH AT	B13	5.	4.02	0.	0.	0.	.00
+	DIVERSION TO	DT-B13	5.	3.85	0.	0.	0.	.00
+	HYDROGRAPH AT	DV-B13	5.	4.02	0.	0.	0.	.00
+	2 COMBINED AT	CPB13	5.	4.02	0.	0.	0.	.03
+	DIVERSION TO	DVGF	1.	3.87	0.	0.	0.	.03
+	HYDROGRAPH AT	DVGF	4.	4.02	0.	0.	0.	.03
+	ROUTED TO	R-B13	4.	4.00	0.	0.	0.	.03
+	2 COMBINED AT	CPGAL	222.	4.48	34.	9.	6.	1.10
+	HYDROGRAPH AT	B5	6.	4.02	0.	0.	0.	.01
+	DIVERSION TO	DT-B5	6.	4.02	0.	0.	0.	.01

	HYDROGRAPH AT							
+		DV-B5	0.	.00	0.	0.	0.	.01
	HYDROGRAPH AT							
+		B11	13.	4.02	1.	0.	0.	.01
	DIVERSION TO							
+		DT-C11	5.	3.83	1.	0.	0.	.01
	HYDROGRAPH AT							
+		DV-C11	8.	4.02	0.	0.	0.	.01
	DIVERSION TO							
+		DT-B11	8.	4.02	0.	0.	0.	.01
	HYDROGRAPH AT							
+		DV-B11	0.	.00	0.	0.	0.	.01
	HYDROGRAPH AT							
+		L1	3.	4.02	0.	0.	0.	.00
	HYDROGRAPH AT							
+		M1	1.	4.02	0.	0.	0.	.00

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
FOR STORM = 1 STORM AREA (SQ MI) = .00									
R-B1	MANE	.31	21.32	242.49	.40	1.00	21.29	243.00	.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4734E+00 EXCESS= .0000E+00 OUTFLOW= .4734E+00 BASIN STORAGE= .3981E-14 PERCENT ERROR= .0

FOR STORM = 2 STORM AREA (SQ MI) = .50									
R-B1	MANE	.31	21.05	242.51	.40	1.00	21.01	243.00	.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4667E+00 EXCESS= .0000E+00 OUTFLOW= .4667E+00 BASIN STORAGE= .3958E-14 PERCENT ERROR= .0

FOR STORM = 3 STORM AREA (SQ MI) = 1.00									
R-B1	MANE	.32	14.69	242.84	.29	1.00	14.68	243.00	.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3390E+00 EXCESS= .0000E+00 OUTFLOW= .3390E+00 BASIN STORAGE= .3900E-14 PERCENT ERROR= .0

FOR STORM = 4 STORM AREA (SQ MI) = 2.80									
R-B1	MANE	.31	5.30	243.35	.13	1.00	5.26	243.00	.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1480E+00 EXCESS= .0000E+00 OUTFLOW= .1480E+00 BASIN STORAGE= .3907E-14 PERCENT ERROR= .0

FOR STORM = 1 STORM AREA (SQ MI) = .00									
R-B13	MANE	.41	3.71	240.86	.04	1.00	3.71	240.00	.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5032E-01 EXCESS= .0000E+00 OUTFLOW= .5052E-01 BASIN STORAGE= .7473E-14 PERCENT ERROR= -.4

FOR STORM = 2 STORM AREA (SQ MI) = .50									
R-B13	MANE	.42	3.68	240.73	.04	1.00	3.67	240.00	.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4921E-01 EXCESS= .0000E+00 OUTFLOW= .4924E-01 BASIN STORAGE= .7400E-14 PERCENT ERROR= -.1

FOR STORM = 3 STORM AREA (SQ MI) = 1.00									
R-B13	MANE	.38	2.69	240.74	.03	1.00	2.69	241.00	.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3451E-01 EXCESS= .0000E+00 OUTFLOW= .3471E-01 BASIN STORAGE= .7444E-14 PERCENT ERROR= -.6

FOR STORM = 4 STORM AREA (SQ MI) = 2.80									
R-B13	MANE	.47	1.24	240.99	.01	1.00	1.24	241.00	.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1741E-01 EXCESS= .0000E+00 OUTFLOW= .1761E-01 BASIN STORAGE= .7703E-14 PERCENT ERROR= -1.1

*** NORMAL END OF HEC-1 ***

10-year HEC-1 Model

```
1*****************************************                                       ******************************************
 *                                       *                                       *                                        *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                       *   U.S. ARMY CORPS OF ENGINEERS         *
 *              JUN  1998                *                                       *   HYDROLOGIC ENGINEERING CENTER        *
 *            VERSION 4.1                *                                       *         609 SECOND STREET              *
 *                                       *                                       *      DAVIS, CALIFORNIA 95616           *
 * RUN DATE   15JUN16  TIME  20:59:46    *                                       *         (916) 756-1104                 *
 *                                       *                                       *                                        *
 *****************************************                                       ******************************************


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


        THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

        THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
        THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
        NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
        DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
        KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                                  HEC-1 INPUT                                                   PAGE  1

        LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          1         ID        Flood Control District of Maricopa County
          2         ID        DM19 PROP - Desert Mountain 19 Post Online Det Basins 1st Flush
          3         ID        10 YEAR
          4         ID        6 Hour  Storm
          5         ID        Unit Hydrograph: S-Graph
          6         ID        Storm: Multiple
          7         ID        06/14/2016
          8         ID        WOOD/PATEL FILE NAME: DM19FT10.DAT
                    *DIAGRAM
          9         IT       1  1JAN99       0    2000
         10         IO       5
         11         IN      15
                    *
         12         JD   2.182  0.0001
         13         PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
         14         PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
         15         PC   0.962   0.972   0.983   0.991   1.000
         16         JD   2.169  0.5000
         17         PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
         18         PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
         19         PC   0.962   0.972   0.983   0.991   1.000
         20         JD   2.154     1.0
         21         PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.075
         22         PC   0.087   0.099   0.119   0.148   0.230   0.407   0.778   0.881   0.919   0.945
         23         PC   0.957   0.968   0.980   0.990   1.000
         24         JD   2.127     2.8
         25         PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
         26         PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
         27         PC   0.950   0.963   0.975   0.988   1.000
                    *

         28         KK      A1   BASIN
         29         BA   0.197
         30         LG    0.29    0.25    5.34    0.26       5
         31         UI       0      39      39      39      50     114     146     182     223     254
         32         UI     279     323     344     355     374     378     378     369     357     338
         33         UI     302     275     245     222     200     181     164     147     133     120
         34         UI     108      94      88      75      74      62      61      53      42      42
         35         UI      42      31      27      27      27      27      25      10      10      10
         36         UI      10      10      10      10      10      10      10      10      10      10
         37         UI      10      10       0       0       0       0       0       0       0       0
                    *

         38         KK    R-A1   ROUTE
         39         RS       3    FLOW
         40         RC   0.060   0.040   0.060     980  0.0224   19.00
         41         RX    0.00   42.00   73.00  106.00  196.00  225.00  251.00  295.00
         42         RY   20.00   15.00   10.00    7.00    6.00    5.00   13.00   19.00
                    *
1                                                  HEC-1 INPUT                                                   PAGE  2

        LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         43         KK      A2   BASIN
         44         BA   0.011
         45         LG    0.35    0.37    5.24    0.25       0
         46         UI       0       7      22      45      62      70      63      46      33      23
         47         UI      16      12       8       6       5       2       2       2       2       0
         48         UI       0       0       0       0       0       0       0       0       0       0
         49         UI       0       0       0       0       0       0       0       0       0       0
         50         UI       0       0       0       0       0       0       0       0       0       0
                    *

         51         KK   CP-A2 COMBINE
         52         HC       2
                    *
```

```
 53          KK     B1   BASIN
 54          BA  0.022
 55          LG   0.28    0.26    5.05    0.31       4
 56          UI      0      12      23      55      81     101     111     106      88      66
 57          UI     51      39      29      23      17      12       9       8       5       3
 58          UI      3       3       3       3       0       0       0       0       0       0
 59          UI      0       0       0       0       0       0       0       0       0       0
 60          UI      0       0       0       0       0       0       0       0       0       0
             *

 61          KK   R-B1   ROUTE
 62          RK    500  0.0200   0.013            CIRC   3.500
             *

 63          KK     B2   BASIN
 64          BA  0.001
 65          LG   0.35    0.36    5.05    0.28       0
 66          UI      0      10      19       7       2       1       0       0       0       0
 67          UI      0       0       0       0       0       0       0       0       0       0
 68          UI      0       0       0       0       0       0       0       0       0       0
 69          UI      0       0       0       0       0       0       0       0       0       0
 70          UI      0       0       0       0       0       0       0       0       0       0
             *

 71          KK     B3   BASIN
 72          BA  0.038
 73          LG   0.29    0.26    5.05    0.30       4
 74          UI      0      12      12      26      47      66      83      99     110     117
 75          UI    118     113     105      88      74      63      54      45      38      32
 76          UI     27      23      19      17      13      13       8       8       8       5
 77          UI      3       3       3       3       3       3       3       3       3       0
 78          UI      0       0       0       0       0       0       0       0       0       0
             *

 79          KK  CP-B3 COMBINE
 80          HC      2
             *
```



```
 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 81          KK  R-CPB3   ROUTE
 82          RS      1    FLOW
 83          RC  0.060   0.040   0.060     300  0.0100   10.00
 84          RX   0.00    7.50   15.00   18.00   21.00   23.00   30.50   38.00
 85          RY  10.00    7.50    5.00    5.00    5.00    5.00    7.50   10.00
             *

 86          KK     B4   BASIN
 87          BA  0.921
 88          LG   0.28    0.27    5.24    0.28       6
 89          UI      0      84      84      84      84      84      84      84      84     173
 90          UI    243     243     297     329     364     405     445     470     511     545
 91          UI    580     602     598     694     695     721     747     752     771     764
 92          UI    810     810     810     810     810     810     803     777     766     760
 93          UI    748     720     694     650     614     589     589     531     511     494
 94          UI    463     445     432     399     393     367     360     329     329     299
 95          UI    299     274     259     259     235     231     231     198     189     189
 96          UI    188     159     159     159     159     143     130     130     130     130
 97          UI    128      90      90      90      90      90      90      90      87      58
 98          UI     58      58      58      58      58      58      58      58      58      58
 99          UI     58      30      21      21      21      21      21      21      21      21
100          UI     21      21      21      21      21      21      21      21      21      21
101          UI     21      21      21      21      21      21      21      21      21      21
102          UI     21      21      21      21      21       0       0       0       0       0
             *

103          KK   DVOC  DIVERT
104          DT   DTOC    0.00  1050.0
105          DI    0.0  2000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
106          DQ    0.0  2000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

107          KK  DETOC STORAGE
108          KO
109          RS      1    STOR
110          SV           0.26    0.59    0.99    1.48
111          SQ           4.00    9.00   12.00   15.00
112          SE           1.00    2.00    3.00    4.00
             *

113          KK   DVOCRETRIEVE
114          DR   DTOC
             *

115          KK    B4C COMBINE
116          HC      2
             *

117          KK   DVOD  DIVERT
118          DT   DTOD    0.00   975.0
119          DI    0.0 20000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
120          DQ    0.0 20000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
             *
```



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 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

121          KK  DETOD STORAGE
122          KO
123          RS      1    STOR
124          SV           0.42    0.89    1.42    2.01
```

```
125             SQ              4.00     9.00    12.00    15.00
126             SE              1.00     2.00     3.00     4.00
                *

127             KK    DVODRETRIEVE
128             DR    DTOD
                *

129             KK       B4D COMBINE
130             HC         2
                *

131             KK    CP-B4 COMBINE
132             HC         2
                *

133             KK  R-CPB4    ROUTE
134             RS         1     FLOW
135             RC     0.060    0.040    0.060      300   0.0300  2631.00
136             RX      0.00    18.90    43.80    54.80    81.50    91.60   120.00   160.00
137             RY    2635.0  2630.00  2629.00  2625.00  2625.00  2629.00  2630.00  2631.00
                *

138             KK    CP-B5 COMBINE
139             HC         2
                *

140             KK  R-CPB5    ROUTE
141             RS         1     FLOW
142             RC     0.060    0.040    0.060      650   0.0300  2631.00
143             RX      0.00    18.90    43.80    54.80    81.50    91.60   120.00   160.00
144             RY    2635.0  2630.00  2629.00  2625.00  2625.00  2629.00  2630.00  2631.00
                *

145             KK        B6    BASIN
146             BA     0.009
147             LG      0.19     0.25     4.45     0.52        3
148             UI         0       26       78      129       74       27        9        4        0        0
149             UI         0        0        0        0        0        0        0        0        0        0
150             UI         0        0        0        0        0        0        0        0        0        0
151             UI         0        0        0        0        0        0        0        0        0        0
152             UI         0        0        0        0        0        0        0        0        0        0
                *

153             KK        B8    BASIN
154             BA     0.010
155             LG      0.13     0.27     4.87     0.30       38
156             UI         0        7       25       39       55       83       63       46       31       15
157             UI        10        6        2        2        2        0        0        0        0        0
158             UI         0        0        0        0        0        0        0        0        0        0
1                                                 HEC-1 INPUT                                          PAGE  5

        LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

159             UI         0        0        0        0        0        0        0        0        0        0
160             UI         0        0        0        0        0        0        0        0        0        0
                *

161             KK      CP68 COMBINE
162             HC         2
                *

163             KK     DET68 STORAGE
164             KO
165             RS         1     STOR
166             SV              0.09     0.21     0.37     0.58
167             SQ              1.00     1.00     2.00     2.00
168             SE    2608.0  2609.00  2610.00  2611.00  2612.00
169             SS    2612.0    20.00     2.80     1.50
                *

170             KK       B6W    BASIN
171             BA     0.003
172             LG      0.13     0.28     3.37     1.04        6
173             UI         0        5       16       29       32       19        9        4        1        1
174             UI         0        0        0        0        0        0        0        0        0        0
175             UI         0        0        0        0        0        0        0        0        0        0
176             UI         0        0        0        0        0        0        0        0        0        0
177             UI         0        0        0        0        0        0        0        0        0        0
                *

178             KK    CP-6W COMBINE
179             HC         3
                *

180             KK    DV-B7   DIVERT
181             DT    DT-B7     0.00      0.0
182             DI       0.0    150.0    300.0    450.0    600.0    750.0    900.0   1050.0   1200.0      0.0
183             DQ       0.0      4.0      9.0     12.0     15.0     18.0     20.0     22.0     24.0      0.0
                *

184             KK    DV-B7RETRIEVE
185             DR    DT-B7
                *

186             KK      B14A    BASIN
187             BA     0.004
188             LG      0.13     0.26     6.16     0.16       39
189             UI         0       62       83        9        0        0        0        0        0        0
190             UI         0        0        0        0        0        0        0        0        0        0
191             UI         0        0        0        0        0        0        0        0        0        0
192             UI         0        0        0        0        0        0        0        0        0        0
193             UI         0        0        0        0        0        0        0        0        0        0
                *
1                                                 HEC-1 INPUT                                          PAGE  6
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 194          KK   CP-V7 COMBINE
 195          HC       2
              *

 196          KK  DETBV7 STORAGE
 197          KO
 198          RS       1    STOR
 199          SV            0.22    0.47    0.77    1.10
 200          SQ            1.00    1.00    2.00   50.00
 201          SE  2606.0 2607.00 2608.00 2609.00 2610.00
              *

 202          KK      B9   BASIN
 203          BA   0.008
 204          LG    0.13    0.28    4.33    0.38      43
 205          UI       0      31      93     116      50      15       4       0       0       0
 206          UI       0       0       0       0       0       0       0       0       0       0
 207          UI       0       0       0       0       0       0       0       0       0       0
 208          UI       0       0       0       0       0       0       0       0       0       0
 209          UI       0       0       0       0       0       0       0       0       0       0
              *

 210          KK   DV-B9  DIVERT
 211          DT   DT-B9    0.21     0.0
 212          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 213          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 214          KK   CP-B9 COMBINE
 215          HC       3
              *

 216          KK  R-CPB9   ROUTE
 217          RS       2    FLOW
 218          RC   0.060   0.040   0.060     750  0.0300 2605.00
 219          RX    0.00   55.30  123.80  129.00  141.80  146.00  155.20  188.60
 220          RY  2608.0 2600.00 2598.00 2596.00 2596.00 2597.80 2598.00 2605.00
              *

 221          KK     B10   BASIN
 222          BA   0.012
 223          LG    0.20    0.25    4.33    0.54       2
 224          UI       0      10      39      58      90     102      69      47      23      13
 225          UI       7       3       3       0       0       0       0       0       0       0
 226          UI       0       0       0       0       0       0       0       0       0       0
 227          UI       0       0       0       0       0       0       0       0       0       0
 228          UI       0       0       0       0       0       0       0       0       0       0
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 229          KK  DV-B10  DIVERT
 230          DT  DT-B10    0.32     0.0
 231          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 232          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 233          KK     B12   BASIN
 234          BA   0.005
 235          LG    0.10    0.25    3.79    0.85       0
 236          UI       0      11      41      56      40      22      12       6       3       1
 237          UI       1       0       0       0       0       0       0       0       0       0
 238          UI       0       0       0       0       0       0       0       0       0       0
 239          UI       0       0       0       0       0       0       0       0       0       0
 240          UI       0       0       0       0       0       0       0       0       0       0
              *

 241          KK     B14   BASIN
 242          BA   0.038
 243          LG    0.17    0.26    5.58    0.27      23
 244          UI       0      23      67     119     155     222     274     198     149     108
 245          UI      58      39      24      12       7       7       7       0       0       0
 246          UI       0       0       0       0       0       0       0       0       0       0
 247          UI       0       0       0       0       0       0       0       0       0       0
 248          UI       0       0       0       0       0       0       0       0       0       0
              *

 249          KK  DV-B14  DIVERT
 250          DT  DT-B14    1.03     0.0
 251          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 252          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 253          KK  CP-B14 COMBINE
 254          HC       4
              *

 255          KK      C1   BASIN
 256          BA   0.023
 257          LG    0.18    0.26    5.05    0.34      14
 258          UI       0      13      33      61      79     104     155     128      99      76
 259          UI      55      29      22      13       8       4       4       4       0       0
 260          UI       0       0       0       0       0       0       0       0       0       0
 261          UI       0       0       0       0       0       0       0       0       0       0
 262          UI       0       0       0       0       0       0       0       0       0       0
              *

 263          KK   DV-C1  DIVERT
 264          DT   DT-C1    0.61     0.0
```

```
 265          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 266          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
1                                        HEC-1 INPUT                                         PAGE  8

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 267          KK   DVC-K  DIVERT
 268          DT   DTC-K    0.00      18
 269          DI     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 270          DQ     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 271          KK   DVC-H  DIVERT
 272          DT   DTC-H    0.00       8
 273          DI     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 274          DQ     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 275          KK     B13   BASIN
 276          BA   0.003
 277          LG    0.12    0.24    7.27    0.11      51
 278          UI       0      82      33       0       0       0       0       0       0       0
 279          UI       0       0       0       0       0       0       0       0       0       0
 280          UI       0       0       0       0       0       0       0       0       0       0
 281          UI       0       0       0       0       0       0       0       0       0       0
 282          UI       0       0       0       0       0       0       0       0       0       0
              *

 283          KK  DV-B13  DIVERT
 284          DT  DT-B13    0.08     0.0
 285          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 286          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 287          KK   CPB13 COMBINE
 288          HC       2
              *

 289          KK    DVGF  DIVERT
 290          DT    DTGF    0.00       1
 291          DI     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 292          DQ     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 293          KK   R-B13   ROUTE
 294          RK     450  0.0090   0.013            CIRC   4.000
              *

 295          KK   CPGAL COMBINE
 296          HC       2
              *

 297          KK      B5   BASIN
 298          BA   0.006
 299          LG    0.23    0.27    5.05    0.38       0
 300          UI       0      15      45      80      54      25      10       2       2       0
 301          UI       0       0       0       0       0       0       0       0       0       0
 302          UI       0       0       0       0       0       0       0       0       0       0
 303          UI       0       0       0       0       0       0       0       0       0       0
 304          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                         PAGE  9

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 305          KK   DV-B5  DIVERT
 306          DT   DT-B5    0.42     0.0
 307          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 308          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 309          KK     B11   BASIN
 310          BA   0.010
 311          LG    0.13    0.27    4.39    0.37      39
 312          UI       0       8      32      48      75      85      57      39      19      11
 313          UI       6       2       2       0       0       0       0       0       0       0
 314          UI       0       0       0       0       0       0       0       0       0       0
 315          UI       0       0       0       0       0       0       0       0       0       0
 316          UI       0       0       0       0       0       0       0       0       0       0
              *

 317          KK  DV-C11  DIVERT
 318          DT  DT-C11     0.0     5.0
 319          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 320          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 321          KK  DV-B11  DIVERT
 322          DT  DV-B11    0.26     0.0
 323          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 324          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
              *

 325          KK      L1   BASIN
 326          BA   0.003
 327          LG    0.35    0.36    5.05    0.28       0
 328          UI       0       6      23      33      25      14       7       4       2       1
 329          UI       1       0       0       0       0       0       0       0       0       0
 330          UI       0       0       0       0       0       0       0       0       0       0
 331          UI       0       0       0       0       0       0       0       0       0       0
 332          UI       0       0       0       0       0       0       0       0       0       0
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            *

333         KK      M1   BASIN
334         BA   0.001
335         LG    0.35    0.36    5.05    0.28       0
336         UI       0       3       9      12       7       4       2       1       0       0
337         UI       0       0       0       0       0       0       0       0       0       0
338         UI       0       0       0       0       0       0       0       0       0       0
339         UI       0       0       0       0       0       0       0       0       0       0
340         UI       0       0       0       0       0       0       0       0       0       0
            *
341         ZZ
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1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    28          A1
                 V
                 V
    38        R-A1
                 .
                 .
    43           .          A2
                 .           .
                 .           .
    51       CP-A2............
                 .
                 .
    53           .          B1
                 .           V
                 .           V
    61           .        R-B1
                 .           .
                 .           .
    63           .           .          B2
                 .           .           .
                 .           .           .
    71           .           .           .          B3
                 .           .           .           .
                 .           .           .           .
    79           .           .       CP-B3............
                 .           .           V
                 .           .           V
    81           .           .      R-CPB3
                 .           .           .
                 .           .           .
    86           .           .           .          B4
                 .           .           .           .
                 .           .           .           .
   104           .           .           .           .------->    DTOC
   103           .           .           .        DVOC
                 .           .           .           V
                 .           .           .           V
   107           .           .           .       DETOC
                 .           .           .           .
                 .           .           .           .
   114           .           .           .           .           .<-------    DTOC
   113           .           .           .           .        DVOC
                 .           .           .           .           .
                 .           .           .           .           .
   115           .           .           .         B4C............
                 .           .           .           .
                 .           .           .           .
   118           .           .           .           .------->    DTOD
   117           .           .           .        DVOD
                 .           .           .           V
                 .           .           .           V
   121           .           .           .       DETOD
                 .           .           .           .
                 .           .           .           .
   128           .           .           .           .           .<-------    DTOD
   127           .           .           .           .        DVOD
                 .           .           .           .           .
                 .           .           .           .           .
   129           .           .           .         B4D............
                 .           .           .           .
                 .           .           .           .
   131           .           .       CP-B4............
                 .           .           V
                 .           .           V
   133           .           .      R-CPB4
                 .           .           .
                 .           .           .
   138           .       CP-B5............
                 .           V
                 .           V
   140           .      R-CPB5
                 .           .
                 .           .
   145           .           .          B6
                 .           .           .
                 .           .           .
   153           .           .           .          B8
                 .           .           .           .
                 .           .           .           .
   161           .           .        CP68............
                 .           .           V
                 .           .           V
   163           .           .       DET68
                 .           .           .
                 .           .           .
   170           .           .           .         B6W
                 .           .           .           .
                 .           .           .           .
   178           .       CP-6W........................
                 .           .
                 .           .
   181           .           .------->  DT-B7
   180           .       DV-B7
                 .           .
                 .           .
   185           .           .           .<-------   DT-B7
   184           .           .       DV-B7
                 .           .           .
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                .           .           .
  186           .           .           .        B14A
                .           .           .           .
                .           .           .           .
  194           .           .       CP-V7............
                .           .           V
                .           .           V
  196           .           .      DETBV7
                .           .           .
                .           .           .
  202           .           .           .          B9
                .           .           .           .
                .           .           .           .
  211           .           .           .           .------->   DT-B9
  210           .           .           .       DV-B9
                .           .           .           .
                .           .           .           .
  214           .       CP-B9........................
                .           V
                .           V
  216           .      R-CPB9
                .           .
                .           .
  221           .           .         B10
                .           .           .
                .           .           .
  230           .           .           .------->  DT-B10
  229           .           .      DV-B10
                .           .           .
                .           .           .
  233           .           .           .         B12
                .           .           .           .
                .           .           .           .
  241           .           .           .           .         B14
                .           .           .           .           .
                .           .           .           .           .
  250           .           .           .           .           .------->  DT-B14
  249           .           .           .           .      DV-B14
                .           .           .           .           .
                .           .           .           .           .
  253           .      CP-B14....................................
                .           .
                .           .
  255           .           .          C1
                .           .           .
                .           .           .
  264           .           .           .------->   DT-C1
  263           .           .       DV-C1
                .           .           .
                .           .           .
  268           .           .           .------->   DTC-K
  267           .           .       DVC-K
                .           .           .
                .           .           .
  272           .           .           .------->   DTC-H
  271           .           .       DVC-H
                .           .           .
                .           .           .
  275           .           .           .         B13
                .           .           .           .
                .           .           .           .
  284           .           .           .           .------->  DT-B13
  283           .           .           .      DV-B13
                .           .           .           .
                .           .           .           .
  287           .           .       CPB13............
                .           .           .
                .           .           .
  290           .           .           .------->    DTGF
  289           .           .        DVGF
                .           .           V
                .           .           V
  293           .           .       R-B13
                .           .           .
                .           .           .
  295           .       CPGAL............
                .           .
                .           .
  297           .           .          B5
                .           .           .
                .           .           .
  306           .           .           .------->   DT-B5
  305           .           .       DV-B5
                .           .           .
                .           .           .
  309           .           .           .         B11
                .           .           .           .
                .           .           .           .
  318           .           .           .           .------->  DT-C11
  317           .           .           .      DV-C11
                .           .           .           .
                .           .           .           .
  322           .           .           .           .------->  DV-B11
  321           .           .           .      DV-B11
                .           .           .           .
                .           .           .           .
  325           .           .           .           .          L1
                .           .           .           .           .
                .           .           .           .           .
  333           .           .           .           .           .          M1
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(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                                                    *****************************************
 *                                       *                                                    *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                    *   U.S. ARMY CORPS OF ENGINEERS        *
 *             JUN  1998                 *                                                    *   HYDROLOGIC ENGINEERING CENTER       *
 *           VERSION 4.1                 *                                                    *         609 SECOND STREET             *
 *                                       *                                                    *      DAVIS, CALIFORNIA 95616          *
 * RUN DATE   15JUN16  TIME  20:59:46    *                                                    *          (916) 756-1104               *
 *                                       *                                                    *                                       *
 *****************************************                                                    *****************************************



                              Flood Control District of Maricopa County
                              DM19 PROP - Desert Mountain 19 Post Online Det Basins 1st Flush
                              10 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: S-Graph
                              Storm: Multiple
                              06/14/2016
                              WOOD/PATEL FILE NAME: DM19FT10.DAT

  10 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                         NMIN          1  MINUTES IN COMPUTATION INTERVAL
                        IDATE     1JAN99  STARTING DATE
                        ITIME       0000  STARTING TIME
                           NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE     2JAN99  ENDING DATE
                       NDTIME       0919  ENDING TIME
                        ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL       .02 HOURS
                 TOTAL TIME BASE     33.32 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

  12 JD          INDEX STORM NO. 1
                        STRM        2.18  PRECIPITATION DEPTH
                        TRDA         .00  TRANSPOSITION DRAINAGE AREA

  13 PI            PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                    .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                    .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .00       .00       .00       .00       .00
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                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  16 JD          INDEX STORM NO. 2
                        STRM        2.17  PRECIPITATION DEPTH
                        TRDA         .50  TRANSPOSITION DRAINAGE AREA

  17 PI            PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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20 JD INDEX STORM NO. 3

STRM 2.15 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

21 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
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24 JD INDEX STORM NO. 4

STRM 2.13 PRECIPITATION DEPTH

TRDA 2.80 TRANSPOSITION DRAINAGE AREA

25 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
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                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00


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

          **************
          *            *
107 KK    *   DETOC    *     STORAGE
          *            *
          **************

108 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE


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

          **************
          *            *
121 KK    *   DETOD    *     STORAGE
          *            *
          **************

122 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE


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

          **************
          *            *
163 KK    *   DET68    *     STORAGE
          *            *
          **************

164 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE


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

          **************
          *            *
196 KK    *  DETBV7    *     STORAGE
          *            *
          **************

197 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE
```

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
+	HYDROGRAPH AT	A1	262.	4.13	19.	5.	3.	.20		
+	ROUTED TO	R-A1	258.	4.18	19.	5.	3.	.20		
+	HYDROGRAPH AT	A2	21.	4.02	1.	0.	0.	.01		
+	2 COMBINED AT	CP-A2	260.	4.18	20.	5.	4.	.21		
+	HYDROGRAPH AT	B1	42.	4.02	2.	0.	0.	.02		
+	ROUTED TO	R-B1	42.	4.03	2.	0.	0.	.02		
+	HYDROGRAPH AT	B2	2.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	B3	63.	4.07	3.	1.	1.	.04		
+	2 COMBINED AT	CP-B3	64.	4.07	3.	1.	1.	.04		
+	ROUTED TO	R-CPB3	63.	4.08	3.	1.	1.	.04		
+	HYDROGRAPH AT	B4	546.	4.43	76.	19.	14.	.92		
+	DIVERSION TO	DTOC	546.	4.43	76.	19.	14.	.92		
+	HYDROGRAPH AT	DVOC	0.	.00	0.	0.	0.	.92		
+	ROUTED TO	DETOC	0.	.00	0.	0.	0.	.92		
+	HYDROGRAPH AT	DVOC	546.	4.43	76.	19.	14.	.92		
+	2 COMBINED AT	B4C	546.	4.43	76.	19.	14.	.92		
+	DIVERSION TO	DTOD	546.	4.43	76.	19.	14.	.92		
+	HYDROGRAPH AT	DVOD	0.	.00	0.	0.	0.	.92		
+	ROUTED TO	DETOD	0.	.00	0.	0.	0.	.92		
+	HYDROGRAPH AT	DVOD	546.	4.43	76.	19.	14.	.92		
+	2 COMBINED AT	B4D	546.	4.43	76.	19.	14.	.92		
+	2 COMBINED AT	CP-B4	546.	4.42	79.	20.	14.	.96		
+	ROUTED TO	R-CPB4	546.	4.43	79.	20.	14.	.96		
+	2 COMBINED AT	CP-B5	543.	4.43	80.	20.	14.	.98		
+	ROUTED TO	R-CPB5	543.	4.43	80.	20.	14.	.98		
+	HYDROGRAPH AT	B6	16.	4.02	1.	0.	0.	.01		
+	HYDROGRAPH AT	B8	22.	4.02	1.	0.	0.	.01		
+	2 COMBINED AT	CP68	39.	4.02	2.	1.	0.	.02		
+	ROUTED TO	DET68	2.	3.92	2.	1.	0.	.02		
+	HYDROGRAPH AT	B6W	4.	4.02	0.	0.	0.	.00		
+	3 COMBINED AT	CP-6W	543.	4.43	81.	20.	15.	1.00		
+	DIVERSION TO	DT-B7	14.	4.43	2.	1.	0.	1.00		

+	HYDROGRAPH AT	DV-B7	527.	4.43	79.	20.	14.	1.00
+	HYDROGRAPH AT	DV-B7	14.	4.43	2.	1.	0.	1.00
+	HYDROGRAPH AT	B14A	9.	4.02	1.	0.	0.	.00
+	2 COMBINED AT	CP-V7	16.	4.02	3.	1.	1.	.00
+	ROUTED TO	DETBV7	13.	4.65	2.	1.	1.	.00
+	HYDROGRAPH AT	B9	18.	4.02	1.	0.	0.	.01
+	DIVERSION TO	DT-B9	16.	3.83	0.	0.	0.	.01
+	HYDROGRAPH AT	DV-B9	18.	4.02	1.	0.	0.	.01
+	3 COMBINED AT	CP-B9	528.	4.43	81.	21.	15.	1.02
+	ROUTED TO	R-CPB9	527.	4.47	81.	21.	15.	1.02
+	HYDROGRAPH AT	B10	21.	4.02	1.	0.	0.	.01
+	DIVERSION TO	DT-B10	21.	4.00	1.	0.	0.	.01
+	HYDROGRAPH AT	DV-B10	21.	4.03	0.	0.	0.	.01
+	HYDROGRAPH AT	B12	8.	4.02	0.	0.	0.	.00
+	HYDROGRAPH AT	B14	82.	4.02	5.	1.	1.	.04
+	DIVERSION TO	DT-B14	77.	3.93	2.	1.	0.	.04
+	HYDROGRAPH AT	DV-B14	82.	4.02	3.	1.	0.	.04
+	4 COMBINED AT	CP-B14	527.	4.47	83.	21.	15.	1.07
+	HYDROGRAPH AT	C1	47.	4.02	2.	1.	0.	.02
+	DIVERSION TO	DT-C1	45.	3.97	1.	0.	0.	.02
+	HYDROGRAPH AT	DV-C1	47.	4.02	1.	0.	0.	.02
+	DIVERSION TO	DTC-K	18.	4.00	1.	0.	0.	.02
+	HYDROGRAPH AT	DVC-K	29.	4.02	0.	0.	0.	.02
+	DIVERSION TO	DTC-H	8.	4.00	0.	0.	0.	.02
+	HYDROGRAPH AT	DVC-H	21.	4.02	0.	0.	0.	.02
+	HYDROGRAPH AT	B13	7.	4.02	1.	0.	0.	.00
+	DIVERSION TO	DT-B13	2.	3.75	0.	0.	0.	.00
+	HYDROGRAPH AT	DV-B13	7.	4.02	0.	0.	0.	.00
+	2 COMBINED AT	CPB13	28.	4.02	1.	0.	0.	.03
+	DIVERSION TO	DTGF	1.	3.78	0.	0.	0.	.03
+	HYDROGRAPH AT	DVGF	27.	4.02	1.	0.	0.	.03
+	ROUTED TO	R-B13	27.	4.02	1.	0.	0.	.03
+	2 COMBINED AT	CPGAL	527.	4.47	83.	21.	15.	1.10
+	HYDROGRAPH AT	B5	11.	4.02	0.	0.	0.	.01
+	DIVERSION TO	DT-B5	11.	4.02	0.	0.	0.	.01

+	HYDROGRAPH AT	DV-B5	0.	.00	0.	0.	0.	.01
+	HYDROGRAPH AT	B11	22.	4.02	1.	0.	0.	.01
+	DIVERSION TO	DT-C11	5.	3.80	1.	0.	0.	.01
+	HYDROGRAPH AT	DV-C11	17.	4.02	1.	0.	0.	.01
+	DIVERSION TO	DV-B11	17.	4.02	1.	0.	0.	.01
+	HYDROGRAPH AT	DV-B11	15.	4.05	0.	0.	0.	.01
+	HYDROGRAPH AT	L1	6.	4.02	0.	0.	0.	.00
+	HYDROGRAPH AT	M1	2.	4.02	0.	0.	0.	.00

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR STORM = 1 STORM AREA (SQ MI) = .00									
R-B1	MANE	.17	42.15	241.37	.84	1.00	42.13	242.00	.84

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9822E+00 EXCESS= .0000E+00 OUTFLOW= .9825E+00 BASIN STORAGE= .3951E-14 PERCENT ERROR= .0

FOR STORM = 2 STORM AREA (SQ MI) = .50									
R-B1	MANE	.18	41.78	241.51	.83	1.00	41.77	242.00	.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9720E+00 EXCESS= .0000E+00 OUTFLOW= .9723E+00 BASIN STORAGE= .3979E-14 PERCENT ERROR= .0

FOR STORM = 3 STORM AREA (SQ MI) = 1.00									
R-B1	MANE	.17	31.78	241.47	.70	1.00	31.77	242.00	.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8268E+00 EXCESS= .0000E+00 OUTFLOW= .8269E+00 BASIN STORAGE= .3940E-14 PERCENT ERROR= .0

FOR STORM = 4 STORM AREA (SQ MI) = 2.80									
R-B1	MANE	.27	16.95	242.35	.57	1.00	16.94	242.00	.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6687E+00 EXCESS= .0000E+00 OUTFLOW= .6687E+00 BASIN STORAGE= .3984E-14 PERCENT ERROR= .0

FOR STORM = 1 STORM AREA (SQ MI) = .00									
R-B13	MANE	.30	26.83	241.14	.21	1.00	26.82	241.00	.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2869E+00 EXCESS= .0000E+00 OUTFLOW= .2870E+00 BASIN STORAGE= .7598E-14 PERCENT ERROR= -.1

FOR STORM = 2 STORM AREA (SQ MI) = .50									
R-B13	MANE	.37	26.43	241.00	.20	1.00	26.43	241.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2821E+00 EXCESS= .0000E+00 OUTFLOW= .2826E+00 BASIN STORAGE= .7502E-14 PERCENT ERROR= -.2

FOR STORM = 3 STORM AREA (SQ MI) = 1.00									
R-B13	MANE	.34	13.15	241.76	.11	1.00	12.37	242.00	.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1582E+00 EXCESS= .0000E+00 OUTFLOW= .1584E+00 BASIN STORAGE= .7731E-14 PERCENT ERROR= -.2

FOR STORM = 4 STORM AREA (SQ MI) = 2.80									
R-B13	MANE	.44	2.57	240.86	.06	1.00	2.57	240.00	.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8541E-01 EXCESS= .0000E+00 OUTFLOW= .8564E-01 BASIN STORAGE= .7698E-14 PERCENT ERROR= -.3

*** NORMAL END OF HEC-1 ***

100-year HEC-1 Model

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1*****************************************                                    ***************************************
 *                                       *                                    *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                    *   U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN  1998                *                                    *   HYDROLOGIC ENGINEERING CENTER     *
 *             VERSION 4.1               *                                    *         609 SECOND STREET           *
 *                                       *                                    *     DAVIS, CALIFORNIA 95616         *
 * RUN DATE   15JUN16  TIME  20:59:52    *                                    *         (916) 756-1104              *
 *                                       *                                    *                                     *
 *****************************************                                    ***************************************


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


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                        HEC-1 INPUT                                               PAGE  1

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1          ID        Flood Control District of Maricopa County
            2          ID        DM19 PROP - Desert Mountain 19 Post Online Det Basins 1st Flush
            3          ID        100 YEAR
            4          ID        6 Hour  Storm
            5          ID        Unit Hydrograph: S-Graph
            6          ID        Storm: Multiple
            7          ID        06/14/2016
            8          ID        WOOD/PATEL FILE NAME: DM19FT100.DAT
                       *DIAGRAM
            9          IT      1  1JAN99       0    2000
           10          IO      5
           11          IN     15
                       *
           12          JD  3.313  0.0001
           13          PC  0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           14          PC  0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           15          PC  0.962   0.972   0.983   0.991   1.000
           16          JD  3.293  0.5000
           17          PC  0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
           18          PC  0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
           19          PC  0.962   0.972   0.983   0.991   1.000
           20          JD  3.270     1.0
           21          PC  0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.075
           22          PC  0.087   0.099   0.119   0.148   0.230   0.407   0.778   0.881   0.919   0.945
           23          PC  0.957   0.968   0.980   0.990   1.000
           24          JD  3.230     2.8
           25          PC  0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
           26          PC  0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
           27          PC  0.950   0.963   0.975   0.988   1.000
                       *

           28          KK     A1   BASIN
           29          BA  0.197
           30          LG   0.29    0.25    5.34    0.26       5
           31          UI      0      39      39      39      50     114     146     182     223     254
           32          UI    279     323     344     355     374     378     378     369     357     338
           33          UI    302     275     245     222     200     181     164     147     133     120
           34          UI    108      94      88      75      74      62      61      53      42      42
           35          UI     42      31      27      27      27      27      25      10      10      10
           36          UI     10      10      10      10      10      10      10      10      10      10
           37          UI     10      10       0       0       0       0       0       0       0       0
                       *

           38          KK   R-A1   ROUTE
           39          RS      3    FLOW
           40          RC  0.060   0.040   0.060     980  0.0224   19.00
           41          RX   0.00   42.00   73.00  106.00  196.00  225.00  251.00  295.00
           42          RY  20.00   15.00   10.00    7.00    6.00    5.00   13.00   19.00
                       *
1                                        HEC-1 INPUT                                               PAGE  2

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           43          KK     A2   BASIN
           44          BA  0.011
           45          LG   0.35    0.37    5.24    0.25       0
           46          UI      0       7      22      45      62      70      63      46      33      23
           47          UI     16      12       8       6       5       2       2       2       2       0
           48          UI      0       0       0       0       0       0       0       0       0       0
           49          UI      0       0       0       0       0       0       0       0       0       0
           50          UI      0       0       0       0       0       0       0       0       0       0
                       *

           51          KK  CP-A2 COMBINE
           52          HC      2
                       *
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  53          KK     B1  BASIN
  54          BA  0.022
  55          LG   0.28   0.26   5.05   0.31      4
  56          UI      0     12     23     55     81    101    111    106     88     66
  57          UI     51     39     29     23     17     12      9      8      5      3
  58          UI      3      3      3      3      0      0      0      0      0      0
  59          UI      0      0      0      0      0      0      0      0      0      0
  60          UI      0      0      0      0      0      0      0      0      0      0
              *

  61          KK   R-B1  ROUTE
  62          RK    500 0.0200  0.013          CIRC  3.500
              *

  63          KK     B2  BASIN
  64          BA  0.001
  65          LG   0.35   0.36   5.05   0.28      0
  66          UI      0     10     19      7      2      1      0      0      0      0
  67          UI      0      0      0      0      0      0      0      0      0      0
  68          UI      0      0      0      0      0      0      0      0      0      0
  69          UI      0      0      0      0      0      0      0      0      0      0
  70          UI      0      0      0      0      0      0      0      0      0      0
              *

  71          KK     B3  BASIN
  72          BA  0.038
  73          LG   0.29   0.26   5.05   0.30      4
  74          UI      0     12     12     26     47     66     83     99    110    117
  75          UI    118    113    105     88     74     63     54     45     38     32
  76          UI     27     23     19     17     13     13      8      8      8      5
  77          UI      3      3      3      3      3      3      3      3      3      0
  78          UI      0      0      0      0      0      0      0      0      0      0
              *

  79          KK  CP-B3 COMBINE
  80          HC      2
              *
1                                          HEC-1 INPUT                                        PAGE  3

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  81          KK  R-CPB3  ROUTE
  82          RS      1   FLOW
  83          RC  0.060  0.040  0.060    300 0.0100  10.00
  84          RX   0.00   7.50  15.00  18.00  21.00  23.00  30.50  38.00
  85          RY  10.00   7.50   5.00   5.00   5.00   5.00   7.50  10.00
              *

  86          KK     B4  BASIN
  87          BA  0.921
  88          LG   0.28   0.27   5.24   0.28      6
  89          UI      0     84     84     84     84     84     84     84     84    173
  90          UI    243    243    297    329    364    405    445    470    511    545
  91          UI    580    602    598    694    695    721    747    752    771    764
  92          UI    810    810    810    810    810    810    803    777    766    760
  93          UI    748    720    694    650    614    589    589    531    511    494
  94          UI    463    445    432    399    393    367    360    329    329    299
  95          UI    299    274    259    259    235    231    231    198    189    189
  96          UI    188    159    159    159    159    143    130    130    130    130
  97          UI    128     90     90     90     90     90     90     90     87     58
  98          UI     58     58     58     58     58     58     58     58     58     58
  99          UI     58     30     21     21     21     21     21     21     21     21
 100          UI     21     21     21     21     21     21     21     21     21     21
 101          UI     21     21     21     21     21     21     21     21     21     21
 102          UI     21     21     21     21     21      0      0      0      0      0
              *

 103          KK   DVOC  DIVERT
 104          DT   DTOC   0.00 1050.0
 105          DI    0.0 2000.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 106          DQ    0.0 2000.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
              *

 107          KK  DETOC STORAGE
 108          KO
 109          RS      1   STOR
 110          SV          0.26   0.59   0.99   1.48
 111          SQ          4.00   9.00  12.00  15.00
 112          SE          1.00   2.00   3.00   4.00
              *

 113          KK   DVOCRETRIEVE
 114          DR   DTOC
              *

 115          KK    B4C COMBINE
 116          HC      2
              *

 117          KK   DVOD  DIVERT
 118          DT   DTOD   0.00  975.0
 119          DI    0.0 20000.0   0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
 120          DQ    0.0 20000.0   0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
              *
1                                          HEC-1 INPUT                                        PAGE  4

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 121          KK  DETOD STORAGE
 122          KO
 123          RS      1   STOR
 124          SV          0.42   0.89   1.42   2.01
```

```
    125        SQ          4.00    9.00   12.00   15.00
    126        SE          1.00    2.00    3.00    4.00
               *

    127        KK    DVODRETRIEVE
    128        DR    DTOD
               *

    129        KK     B4D COMBINE
    130        HC       2
               *

    131        KK   CP-B4 COMBINE
    132        HC       2
               *

    133        KK  R-CPB4   ROUTE
    134        RS       1    FLOW
    135        RC   0.060   0.040   0.060     300  0.0300 2631.00
    136        RX    0.00   18.90   43.80   54.80   81.50   91.60  120.00  160.00
    137        RY  2635.0 2630.00 2629.00 2625.00 2625.00 2629.00 2630.00 2631.00
               *

    138        KK   CP-B5 COMBINE
    139        HC       2
               *

    140        KK  R-CPB5   ROUTE
    141        RS       1    FLOW
    142        RC   0.060   0.040   0.060     650  0.0300 2631.00
    143        RX    0.00   18.90   43.80   54.80   81.50   91.60  120.00  160.00
    144        RY  2635.0 2630.00 2629.00 2625.00 2625.00 2629.00 2630.00 2631.00
               *

    145        KK      B6   BASIN
    146        BA   0.009
    147        LG    0.19    0.25    4.45    0.52       3
    148        UI       0      26      78     129      74      27       9       4       0       0
    149        UI       0       0       0       0       0       0       0       0       0       0
    150        UI       0       0       0       0       0       0       0       0       0       0
    151        UI       0       0       0       0       0       0       0       0       0       0
    152        UI       0       0       0       0       0       0       0       0       0       0
               *

    153        KK      B8   BASIN
    154        BA   0.010
    155        LG    0.13    0.27    4.87    0.30      38
    156        UI       0       7      25      39      55      83      63      46      31      15
    157        UI      10       6       2       2       2       0       0       0       0       0
    158        UI       0       0       0       0       0       0       0       0       0       0
1                                          HEC-1 INPUT                                         PAGE  5

   LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

    159        UI       0       0       0       0       0       0       0       0       0       0
    160        UI       0       0       0       0       0       0       0       0       0       0
               *

    161        KK    CP68 COMBINE
    162        HC       2
               *

    163        KK   DET68 STORAGE
    164        KO
    165        RS       1    STOR
    166        SV            0.09    0.21    0.37    0.58
    167        SQ            1.00    1.00    2.00    2.00
    168        SE  2608.0 2609.00 2610.00 2611.00 2612.00
    169        SS  2612.0   20.00    2.80    1.50
               *

    170        KK     B6W   BASIN
    171        BA   0.003
    172        LG    0.13    0.28    3.37    1.04       6
    173        UI       0       5      16      29      32      19       9       4       1       1
    174        UI       0       0       0       0       0       0       0       0       0       0
    175        UI       0       0       0       0       0       0       0       0       0       0
    176        UI       0       0       0       0       0       0       0       0       0       0
    177        UI       0       0       0       0       0       0       0       0       0       0
               *

    178        KK   CP-6W COMBINE
    179        HC       3
               *

    180        KK   DV-B7  DIVERT
    181        DT   DT-B7    0.00     0.0
    182        DI     0.0   150.0   300.0   450.0   600.0   750.0   900.0  1050.0  1200.0     0.0
    183        DQ     0.0     4.0     9.0    12.0    15.0    18.0    20.0    22.0    24.0     0.0
               *

    184        KK   DV-B7RETRIEVE
    185        DR   DT-B7
               *

    186        KK    B14A   BASIN
    187        BA   0.004
    188        LG    0.13    0.26    6.16    0.16      39
    189        UI       0      62      83       9       0       0       0       0       0       0
    190        UI       0       0       0       0       0       0       0       0       0       0
    191        UI       0       0       0       0       0       0       0       0       0       0
    192        UI       0       0       0       0       0       0       0       0       0       0
    193        UI       0       0       0       0       0       0       0       0       0       0
               *
1                                          HEC-1 INPUT                                         PAGE  6
```

```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  194          KK   CP-V7 COMBINE
  195          HC       2
               *

  196          KK  DETBV7 STORAGE
  197          KO
  198          RS       1    STOR
  199          SV            0.22    0.47    0.77    1.10
  200          SQ            1.00    1.00    2.00   50.00
  201          SE  2606.0 2607.00 2608.00 2609.00 2610.00
               *

  202          KK      B9   BASIN
  203          BA   0.008
  204          LG    0.13    0.28    4.33    0.38      43
  205          UI       0      31      93     116      50      15       4       0       0       0
  206          UI       0       0       0       0       0       0       0       0       0       0
  207          UI       0       0       0       0       0       0       0       0       0       0
  208          UI       0       0       0       0       0       0       0       0       0       0
  209          UI       0       0       0       0       0       0       0       0       0       0
               *

  210          KK   DV-B9  DIVERT
  211          DT   DT-B9    0.21     0.0
  212          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
  213          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               *

  214          KK   CP-B9 COMBINE
  215          HC       3
               *

  216          KK  R-CPB9   ROUTE
  217          RS       1    FLOW
  218          RC   0.060   0.040   0.060     750  0.0300 2605.00
  219          RX    0.00   55.30  123.80  129.00  141.80  146.00  155.20  188.60
  220          RY  2608.0 2600.00 2598.00 2596.00 2596.00 2597.80 2598.00 2605.00
               *

  221          KK     B10   BASIN
  222          BA   0.012
  223          LG    0.20    0.25    4.33    0.54       2
  224          UI       0      10      39      58      90     102      69      47      23      13
  225          UI       7       3       3       0       0       0       0       0       0       0
  226          UI       0       0       0       0       0       0       0       0       0       0
  227          UI       0       0       0       0       0       0       0       0       0       0
  228          UI       0       0       0       0       0       0       0       0       0       0
               *
```



```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  229          KK  DT-B10  DIVERT
  230          DT  DT-B10    0.32     0.0
  231          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
  232          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               *

  233          KK     B12   BASIN
  234          BA   0.005
  235          LG    0.10    0.25    3.79    0.85       0
  236          UI       0      11      41      56      40      22      12       6       3       1
  237          UI       1       0       0       0       0       0       0       0       0       0
  238          UI       0       0       0       0       0       0       0       0       0       0
  239          UI       0       0       0       0       0       0       0       0       0       0
  240          UI       0       0       0       0       0       0       0       0       0       0
               *

  241          KK     B14   BASIN
  242          BA   0.038
  243          LG    0.17    0.26    5.58    0.27      23
  244          UI       0      23      67     119     155     222     274     198     149     108
  245          UI      58      39      24      12       7       7       7       0       0       0
  246          UI       0       0       0       0       0       0       0       0       0       0
  247          UI       0       0       0       0       0       0       0       0       0       0
  248          UI       0       0       0       0       0       0       0       0       0       0
               *

  249          KK  DV-B14  DIVERT
  250          DT  DT-B14    1.03     0.0
  251          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
  252          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
               *

  253          KK  CP-B14 COMBINE
  254          HC       4
               *

  255          KK      C1   BASIN
  256          BA   0.023
  257          LG    0.18    0.26    5.05    0.34      14
  258          UI       0      13      33      61      79     104     155     128      99      76
  259          UI      55      29      22      13       8       4       4       4       0       0
  260          UI       0       0       0       0       0       0       0       0       0       0
  261          UI       0       0       0       0       0       0       0       0       0       0
  262          UI       0       0       0       0       0       0       0       0       0       0
               *

  263          KK   DV-C1  DIVERT
  264          DT   DT-C1    0.61     0.0
```

```
 265          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 266          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
```


```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 267          KK   DVC-K  DIVERT
 268          DT   DTC-K    0.00      50
 269          DI     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 270          DQ     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 271          KK   DVC-H  DIVERT
 272          DT   DTC-H    0.00      15
 273          DI     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 274          DQ     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 275          KK     B13   BASIN
 276          BA   0.003
 277          LG    0.12    0.24    7.27    0.11      51
 278          UI       0      82      33       0       0       0       0       0       0       0
 279          UI       0       0       0       0       0       0       0       0       0       0
 280          UI       0       0       0       0       0       0       0       0       0       0
 281          UI       0       0       0       0       0       0       0       0       0       0
 282          UI       0       0       0       0       0       0       0       0       0       0
              *

 283          KK  DV-B13  DIVERT
 284          DT  DT-B13    0.08     0.0
 285          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 286          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 287          KK   CPB13 COMBINE
 288          HC       2
              *

 289          KK    DVGF  DIVERT
 290          DT    DTGF    0.00       3
 291          DI     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 292          DQ     0.0    1000     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 293          KK   R-B13   ROUTE
 294          RK     450  0.0090   0.013            CIRC   4.000
              *

 295          KK   CPGAL COMBINE
 296          HC       2
              *

 297          KK      B5   BASIN
 298          BA   0.006
 299          LG    0.23    0.27    5.05    0.38       0
 300          UI       0      15      45      80      54      25      10       2       2       0
 301          UI       0       0       0       0       0       0       0       0       0       0
 302          UI       0       0       0       0       0       0       0       0       0       0
 303          UI       0       0       0       0       0       0       0       0       0       0
 304          UI       0       0       0       0       0       0       0       0       0       0
              *
```


```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 305          KK   DV-B5  DIVERT
 306          DT   DT-B5    0.42     0.0
 307          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 308          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 309          KK     B11   BASIN
 310          BA   0.010
 311          LG    0.13    0.27    4.39    0.37      39
 312          UI       0       8      32      48      75      85      57      39      19      11
 313          UI       6       2       2       0       0       0       0       0       0       0
 314          UI       0       0       0       0       0       0       0       0       0       0
 315          UI       0       0       0       0       0       0       0       0       0       0
 316          UI       0       0       0       0       0       0       0       0       0       0
              *

 317          KK  DV-C11  DIVERT
 318          DT  DT-C11     0.0     5.0
 319          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 320          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 321          KK  DV-B11  DIVERT
 322          DT  DT-B11    0.26     0.0
 323          DI     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 324          DQ     0.0  1000.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
              *
              *

 325          KK      L1   BASIN
 326          BA   0.003
 327          LG    0.35    0.36    5.05    0.28       0
 328          UI       0       6      23      33      25      14       7       4       2       1
 329          UI       1       0       0       0       0       0       0       0       0       0
 330          UI       0       0       0       0       0       0       0       0       0       0
 331          UI       0       0       0       0       0       0       0       0       0       0
 332          UI       0       0       0       0       0       0       0       0       0       0
```

```
              *

333           KK     M1   BASIN
334           BA  0.001
335           LG   0.35    0.36    5.05    0.28       0
336           UI      0       3       9      12       7       4       2       1       0       0
337           UI      0       0       0       0       0       0       0       0       0       0
338           UI      0       0       0       0       0       0       0       0       0       0
339           UI      0       0       0       0       0       0       0       0       0       0
340           UI      0       0       0       0       0       0       0       0       0       0
              *
341           ZZ
```

```
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

    28          A1
                 V
                 V
    38        R-A1
                 .
                 .
    43           .          A2
                 .           .
                 .           .
    51       CP-A2............
                 .
                 .
    53           .          B1
                 .           V
                 .           V
    61           .        R-B1
                 .           .
                 .           .
    63           .           .          B2
                 .           .           .
                 .           .           .
    71           .           .           .          B3
                 .           .           .           .
                 .           .           .           .
    79           .           .       CP-B3............
                 .           .           V
                 .           .           V
    81           .           .      R-CPB3
                 .           .           .
                 .           .           .
    86           .           .           .          B4
                 .           .           .           .
                 .           .           .           .
   104           .           .           .           .------->    DTOC
   103           .           .           .        DVOC
                 .           .           .           V
                 .           .           .           V
   107           .           .           .       DETOC
                 .           .           .           .
                 .           .           .           .
   114           .           .           .           .           .<-------    DTOC
   113           .           .           .           .        DVOC
                 .           .           .           .           .
                 .           .           .           .           .
   115           .           .           .         B4C............
                 .           .           .           .
                 .           .           .           .
   118           .           .           .           .------->    DTOD
   117           .           .           .        DVOD
                 .           .           .           V
                 .           .           .           V
   121           .           .           .       DETOD
                 .           .           .           .
                 .           .           .           .
   128           .           .           .           .           .<-------    DTOD
   127           .           .           .           .        DVOD
                 .           .           .           .           .
                 .           .           .           .           .
   129           .           .           .         B4D............
                 .           .           .           .
                 .           .           .           .
   131           .           .       CP-B4............
                 .           .           V
                 .           .           V
   133           .           .      R-CPB4
                 .           .           .
                 .           .           .
   138           .       CP-B5............
                 .           V
                 .           V
   140           .      R-CPB5
                 .           .
                 .           .
   145           .           .          B6
                 .           .           .
                 .           .           .
   153           .           .           .          B8
                 .           .           .           .
                 .           .           .           .
   161           .           .        CP68............
                 .           .           V
                 .           .           V
   163           .           .       DET68
                 .           .           .
                 .           .           .
   170           .           .           .         B6W
                 .           .           .           .
                 .           .           .           .
   178           .       CP-6W........................
                 .           .
                 .           .
   181           .           .------->   DT-B7
   180           .       DV-B7
                 .           .
                 .           .
   185           .           .           .<-------   DT-B7
   184           .           .       DV-B7
                 .           .           .
```

```
  186          .           .           .         B14A
               .           .           .           .
               .           .           .           .
  194          .           .       CP-V7............
               .           .           V
               .           .           V
  196          .           .      DETBV7
               .           .           .
               .           .           .
  202          .           .           .          B9
               .           .           .           .
               .           .           .           .
  211          .           .           .           .------->  DT-B9
  210          .           .           .       DV-B9
               .           .           .           .
               .           .           .           .
  214          .      CP-B9.........................
               .           V
               .           V
  216          .      R-CPB9
               .           .
               .           .
  221          .           .         B10
               .           .           .
               .           .           .
  230          .           .           .------->  DT-B10
  229          .           .      DT-B10
               .           .           .
               .           .           .
  233          .           .           .         B12
               .           .           .           .
               .           .           .           .
  241          .           .           .           .         B14
               .           .           .           .           .
               .           .           .           .           .
  250          .           .           .           .           .------->  DT-B14
  249          .           .           .           .      DV-B14
               .           .           .           .           .
               .           .           .           .           .
  253          .     CP-B14.....................................
               .           .
               .           .
  255          .           .          C1
               .           .           .
               .           .           .
  264          .           .           .------->   DT-C1
  263          .           .       DV-C1
               .           .           .
               .           .           .
  268          .           .           .------->   DTC-K
  267          .           .       DVC-K
               .           .           .
               .           .           .
  272          .           .           .------->   DTC-H
  271          .           .       DVC-H
               .           .           .
               .           .           .
  275          .           .           .         B13
               .           .           .           .
               .           .           .           .
  284          .           .           .           .------->  DT-B13
  283          .           .           .      DV-B13
               .           .           .           .
               .           .           .           .
  287          .           .       CPB13............
               .           .           .
               .           .           .
  290          .           .           .------->    DTGF
  289          .           .        DVGF
               .           .           V
               .           .           V
  293          .           .       R-B13
               .           .           .
               .           .           .
  295          .      CPGAL.............
               .           .
               .           .
  297          .           .          B5
               .           .           .
               .           .           .
  306          .           .           .------->   DT-B5
  305          .           .       DV-B5
               .           .           .
               .           .           .
  309          .           .           .         B11
               .           .           .           .
               .           .           .           .
  318          .           .           .           .------->  DT-C11
  317          .           .           .      DV-C11
               .           .           .           .
               .           .           .           .
  322          .           .           .           .------->  DT-B11
  321          .           .           .      DV-B11
               .           .           .           .
               .           .           .           .
  325          .           .           .           .          L1
               .           .           .           .           .
               .           .           .           .           .
  333          .           .           .           .           .          M1

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1****************************************                                         ****************************************
 *                                      *                                         *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                         *   U.S. ARMY CORPS OF ENGINEERS       *
 *            JUN  1998                 *                                         *   HYDROLOGIC ENGINEERING CENTER      *
 *          VERSION 4.1                 *                                         *        609 SECOND STREET             *
 *                                      *                                         *     DAVIS, CALIFORNIA 95616          *
 * RUN DATE   15JUN16  TIME  20:59:52   *                                         *          (916) 756-1104              *
 *                                      *                                         *                                      *
****************************************                                         ****************************************



                              Flood Control District of Maricopa County
                              DM19 PROP - Desert Mountain 19 Post Online Det Basins 1st Flush
                              100 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: S-Graph
                              Storm: Multiple
                              06/14/2016
                              WOOD/PATEL FILE NAME: DM19FT100.DAT

  10 IO           OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT            HYDROGRAPH TIME DATA
                         NMIN          1  MINUTES IN COMPUTATION INTERVAL
                        IDATE     1JAN99  STARTING DATE
                        ITIME       0000  STARTING TIME
                           NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE     2JAN99  ENDING DATE
                       NDTIME       0919  ENDING TIME
                        ICENT         19  CENTURY MARK

                    COMPUTATION INTERVAL      .02 HOURS
                         TOTAL TIME BASE    33.32 HOURS

        ENGLISH UNITS
             DRAINAGE AREA           SQUARE MILES
             PRECIPITATION DEPTH     INCHES
             LENGTH, ELEVATION       FEET
             FLOW                    CUBIC FEET PER SECOND
             STORAGE VOLUME          ACRE-FEET
             SURFACE AREA            ACRES
             TEMPERATURE             DEGREES FAHRENHEIT

  12 JD           INDEX STORM NO. 1
                         STRM       3.31  PRECIPITATION DEPTH
                         TRDA        .00  TRANSPOSITION DRAINAGE AREA

  13 PI             PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                        .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                        .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
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  16 JD           INDEX STORM NO. 2
                         STRM       3.29  PRECIPITATION DEPTH
                         TRDA        .50  TRANSPOSITION DRAINAGE AREA

  17 PI             PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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20 JD INDEX STORM NO. 3

STRM 3.27 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

21 PI PRECIPITATION PATTERN

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24 JD INDEX STORM NO. 4

STRM 3.23 PRECIPITATION DEPTH

TRDA 2.80 TRANSPOSITION DRAINAGE AREA

25 PI PRECIPITATION PATTERN

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          *            *
107 KK    *   DETOC    *     STORAGE
          *            *
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108 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

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          *            *
121 KK    *   DETOD    *     STORAGE
          *            *
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122 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

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          *            *
163 KK    *   DET68    *     STORAGE
          *            *
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164 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

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          *            *
196 KK    *   DETBV7   *     STORAGE
          *            *
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197 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          5  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE
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1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	A1	468.	4.13	38.	10.	7.	.20		
+	ROUTED TO	R-A1	462.	4.18	38.	10.	7.	.20		
+	HYDROGRAPH AT	A2	36.	4.02	2.	0.	0.	.01		
+	2 COMBINED AT	CP-A2	467.	4.18	40.	10.	7.	.21		
+	HYDROGRAPH AT	B1	72.	4.02	4.	1.	1.	.02		
+	ROUTED TO	R-B1	72.	4.03	4.	1.	1.	.02		
+	HYDROGRAPH AT	B2	3.	4.02	0.	0.	0.	.00		
+	HYDROGRAPH AT	B3	111.	4.07	7.	2.	1.	.04		
+	2 COMBINED AT	CP-B3	111.	4.05	7.	2.	1.	.04		
+	ROUTED TO	R-CPB3	111.	4.07	7.	2.	1.	.04		
+	HYDROGRAPH AT	B4	1110.	4.42	163.	41.	29.	.92		
+	DIVERSION TO	DTOC	1050.	4.33	161.	40.	29.	.92		
+	HYDROGRAPH AT	DVOC	60.	4.42	2.	0.	0.	.92		
+	ROUTED TO	DETOC	8.	4.52	2.	0.	0.	.92		
+	HYDROGRAPH AT	DVOC	1050.	4.33	161.	40.	29.	.92		
+	2 COMBINED AT	B4C	1058.	4.50	163.	41.	29.	.92		
+	DIVERSION TO	DTOD	975.	4.28	159.	40.	29.	.92		
+	HYDROGRAPH AT	DVOD	83.	4.50	3.	1.	1.	.92		
+	ROUTED TO	DETOD	12.	4.58	3.	1.	1.	.92		
+	HYDROGRAPH AT	DVOD	975.	4.28	159.	40.	29.	.92		
+	2 COMBINED AT	B4D	987.	4.57	162.	41.	29.	.92		
+	2 COMBINED AT	CP-B4	1012.	4.27	168.	42.	30.	.96		
+	ROUTED TO	R-CPB4	1013.	4.28	168.	42.	30.	.96		
+	2 COMBINED AT	CP-B5	1024.	4.28	172.	43.	31.	.98		
+	ROUTED TO	R-CPB5	1021.	4.30	172.	43.	31.	.98		
+	HYDROGRAPH AT	B6	29.	4.02	1.	0.	0.	.01		
+	HYDROGRAPH AT	B8	36.	4.02	2.	1.	0.	.01		
+	2 COMBINED AT	CP68	65.	4.02	4.	1.	1.	.02		
+	ROUTED TO	DET68	2.	3.83	2.	1.	1.	.02		
+	HYDROGRAPH AT	B6W	9.	4.02	0.	0.	0.	.00		
+	3 COMBINED AT	CP-6W	1022.	4.30	173.	44.	32.	1.00		
+	DIVERSION TO	DT-B7	22.	4.30	4.	1.	1.	1.00		

+	HYDROGRAPH AT	DV-B7	1001.	4.30	169.	43.	31.	1.00
+	HYDROGRAPH AT	DV-B7	22.	4.30	4.	1.	1.	1.00
+	HYDROGRAPH AT	B14A	15.	4.02	1.	0.	0.	.00
+	2 COMBINED AT	CP-V7	29.	4.02	5.	1.	1.	.00
+	ROUTED TO	DETBV7	22.	4.53	5.	1.	1.	.00
+	HYDROGRAPH AT	B9	29.	4.02	2.	1.	0.	.01
+	DIVERSION TO	DT-B9	8.	3.67	0.	0.	0.	.01
+	HYDROGRAPH AT	DV-B9	29.	4.02	2.	0.	0.	.01
+	3 COMBINED AT	CP-B9	1022.	4.30	174.	45.	32.	1.02
+	ROUTED TO	R-CPB9	1016.	4.33	174.	45.	32.	1.02
+	HYDROGRAPH AT	B10	38.	4.02	2.	0.	0.	.01
+	DIVERSION TO	DT-B10	35.	3.88	1.	0.	0.	.01
+	HYDROGRAPH AT	DT-B10	38.	4.02	1.	0.	0.	.01
+	HYDROGRAPH AT	B12	15.	4.02	1.	0.	0.	.00
+	HYDROGRAPH AT	B14	134.	4.02	9.	2.	2.	.04
+	DIVERSION TO	DT-B14	50.	3.82	2.	1.	0.	.04
+	HYDROGRAPH AT	DV-B14	134.	4.02	6.	2.	1.	.04
+	4 COMBINED AT	CP-B14	1027.	4.32	181.	46.	33.	1.07
+	HYDROGRAPH AT	C1	78.	4.02	5.	1.	1.	.02
+	DIVERSION TO	DT-C1	48.	3.87	1.	0.	0.	.02
+	HYDROGRAPH AT	DV-C1	78.	4.02	3.	1.	1.	.02
+	DIVERSION TO	DTC-K	50.	3.88	3.	1.	0.	.02
+	HYDROGRAPH AT	DVC-K	28.	4.02	1.	0.	0.	.02
+	DIVERSION TO	DTC-H	15.	3.92	1.	0.	0.	.02
+	HYDROGRAPH AT	DVC-H	13.	4.02	0.	0.	0.	.02
+	HYDROGRAPH AT	B13	11.	4.02	1.	0.	0.	.00
+	DIVERSION TO	DT-B13	4.	3.55	0.	0.	0.	.00
+	HYDROGRAPH AT	DV-B13	11.	4.02	1.	0.	0.	.00
+	2 COMBINED AT	CPB13	24.	4.02	1.	0.	0.	.03
+	DIVERSION TO	DTGF	3.	3.58	0.	0.	0.	.03
+	HYDROGRAPH AT	DVGF	21.	4.02	1.	0.	0.	.03
+	ROUTED TO	R-B13	21.	4.02	1.	0.	0.	.03
+	2 COMBINED AT	CPGAL	1025.	4.32	181.	46.	33.	1.10
+	HYDROGRAPH AT	B5	20.	4.02	1.	0.	0.	.01
+	DIVERSION TO	DT-B5	20.	4.02	1.	0.	0.	.01

+	HYDROGRAPH AT	DV-B5	17.	4.03	0.	0.	0.	.01
+	HYDROGRAPH AT	B11	35.	4.02	2.	1.	0.	.01
+	DIVERSION TO	DT-C11	5.	3.58	1.	0.	0.	.01
+	HYDROGRAPH AT	DV-C11	30.	4.02	1.	0.	0.	.01
+	DIVERSION TO	DT-B11	28.	3.90	1.	0.	0.	.01
+	HYDROGRAPH AT	DV-B11	30.	4.02	1.	0.	0.	.01
+	HYDROGRAPH AT	L1	10.	4.02	1.	0.	0.	.00
+	HYDROGRAPH AT	M1	3.	4.02	0.	0.	0.	.00

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT (INTERPOLATED TO COMPUTATION INTERVAL)	PEAK (INTERPOLATED TO COMPUTATION INTERVAL)	TIME TO PEAK (INTERPOLATED TO COMPUTATION INTERVAL)	VOLUME (INTERPOLATED TO COMPUTATION INTERVAL)
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR STORM = 1 STORM AREA (SQ MI) = .00									
R-B1	MANE	.30	72.25	241.40	1.72	1.00	72.12	242.00	1.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2021E+01 EXCESS= .0000E+00 OUTFLOW= .2021E+01 BASIN STORAGE= .3970E-14 PERCENT ERROR= .0

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
FOR STORM = 2 STORM AREA (SQ MI) = .50									
R-B1	MANE	.18	71.78	241.39	1.71	1.00	71.60	242.00	1.71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2002E+01 EXCESS= .0000E+00 OUTFLOW= .2003E+01 BASIN STORAGE= .3981E-14 PERCENT ERROR= .0

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
FOR STORM = 3 STORM AREA (SQ MI) = 1.00									
R-B1	MANE	.17	56.32	241.36	1.57	1.00	56.19	242.00	1.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1841E+01 EXCESS= .0000E+00 OUTFLOW= .1842E+01 BASIN STORAGE= .3970E-14 PERCENT ERROR= .0

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
FOR STORM = 4 STORM AREA (SQ MI) = 2.80									
R-B1	MANE	.17	33.58	241.35	1.40	1.00	33.53	242.00	1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1647E+01 EXCESS= .0000E+00 OUTFLOW= .1647E+01 BASIN STORAGE= .3963E-14 PERCENT ERROR= .0

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
FOR STORM = 1 STORM AREA (SQ MI) = .00									
R-B13	MANE	.35	21.50	240.86	.23	1.00	21.47	241.00	.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3152E+00 EXCESS= .0000E+00 OUTFLOW= .3155E+00 BASIN STORAGE= .7448E-14 PERCENT ERROR= -.1

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
FOR STORM = 2 STORM AREA (SQ MI) = .50									
R-B13	MANE	.39	20.87	240.84	.22	1.00	20.79	241.00	.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3053E+00 EXCESS= .0000E+00 OUTFLOW= .3054E+00 BASIN STORAGE= .7516E-14 PERCENT ERROR= .0

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
FOR STORM = 3 STORM AREA (SQ MI) = 1.00									
R-B13	MANE	.31	5.94	240.94	.10	1.00	5.94	241.00	.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1403E+00 EXCESS= .0000E+00 OUTFLOW= .1408E+00 BASIN STORAGE= .7520E-14 PERCENT ERROR= -.4

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK	TIME TO PEAK	VOLUME
FOR STORM = 4 STORM AREA (SQ MI) = 2.80									
R-B13	MANE	.45	2.67	240.59	.06	1.00	2.67	240.00	.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8898E-01 EXCESS= .0000E+00 OUTFLOW= .8918E-01 BASIN STORAGE= .7557E-14 PERCENT ERROR= -.2

*** NORMAL END OF HEC-1 ***

APPENDIX C

Site Retention Calculations

Required First Flush Storm Water Calculations

Provided Storm Water Calculations

Required First Flush Storm Water Calculations

First Flush Volume Required

Description: Desert Mountain Parcel 19
Date: 05/06/16
Location: City of Scottsdale
Reference:

City of Scottsdale, *Design Standards and Policies Manual Chapter 4 Grading & Drainage*, January 2010.

Known Values: First Flush
0.5 inches

Calc. Values: V=(P/12)*A*C

V = Retention Volume Required
C = Runoff Coefficient
P = Precipitation amount=100-year 2 hour rainfall
A = Area of Watershed Contributing

Drainage Area	Area (SF)	Area (ac)	Weighted Runoff Coefficient	First Flush Volume (ac-ft)	Required Pre vs Post Volume (ac ft)
B5	165024	3.79	1.00	0.16	0.42
B6	322261	5.50	1.00	0.23	N/A
B8	300366	6.90	1.00	0.29	N/A
B9	217378	4.99	1.00	0.21	N/A
B10	335363	7.70	1.00	0.32	N/A
B11	269364	6.18	1.00	0.26	N/A
B13	80916	1.86	1.00	0.08	N/A
B14	1072718	24.63	1.00	1.03	N/A
B14A	115650	2.65	1.00	0.11	N/A
C1	636403	14.61	1.00	0.61	N/A
			TOTAL =	**3.28**	

Provided Storm Water Calculations

Off-Site Detention Basin Capacity

Description: Proposed Detention Basin Capacities
Project: **Desert Mountain Parcel 19**
Reference: *Drainage Design Manual for Maricopa County, Arizona - Hydrology*
City of Scottsdale, *Design Standards and Policies Manual*

Basin IDs	Bottom Contour Area	Top Contour	Bottom Elevation	Top Elevation	Volume Provided	Volume Provided
Basin 3	17,184	19,439	0.0	1	**0.42**	**2.01**
	19,439	21,796	1.0	2	**0.47**	
	21,796	24,252	2.0	3	**0.53**	
	24,252	26,810.00	3.0	4	**0.59**	

Basin IDs	Bottom Contour Area	Top Contour	Bottom Elevation	Top Elevation	Volume Provided	Volume Provided
Basin 4	10,798	13,254	2680.0	2681.0	**0.28**	**1.39**
	13,254	15,028	2681.0	2682.0	**0.32**	
	15,028	17,134	2682.0	2683.0	**0.37**	
	17,134	19,270	2683.0	2684.0	**0.42**	
	19,270	22,350	2684.0	2684.0	**0.00**	

On-Site Detention Basin Capacity

Description: Proposed Detention Basin Capacities
Project: **Desert Mountain Parcel 19**
Reference: *Drainage Design Manual for Maricopa County, Arizona - Hydrology*
City of Scottsdale, *Design Standards and Policies Manual*

Basin IDs	Bottom Contour Area	Top Contour	Bottom Elevation	Top Elevation	Volume Provided	Volume Provided
Basin 1	8,584	10,210	2,606.0	2,607	**0.22**	**1.10**
	10,210	11,949	2,607.0	2,608	**0.25**	
	11,949	13,800	2,608.0	2,609	**0.30**	
	13,800	15,757	2,609.0	2,610	**0.34**	

Basin IDs	Bottom Contour Area	Top Contour	Bottom Elevation	Top Elevation	Volume Provided	Volume Provided
Basin 2	3,232	4,553	2,608.0	2,609	**0.09**	**0.58**
	4,553	6,056	2,609.0	2,610	**0.12**	
	6,056	7,964	2,610.0	2,611	**0.16**	
	7,964	10,184	2,611.0	2,612	**0.21**	

APPENDIX D

Hydraulic Calculations

HEC-RAS Output Files Existing & Proposed Conditions

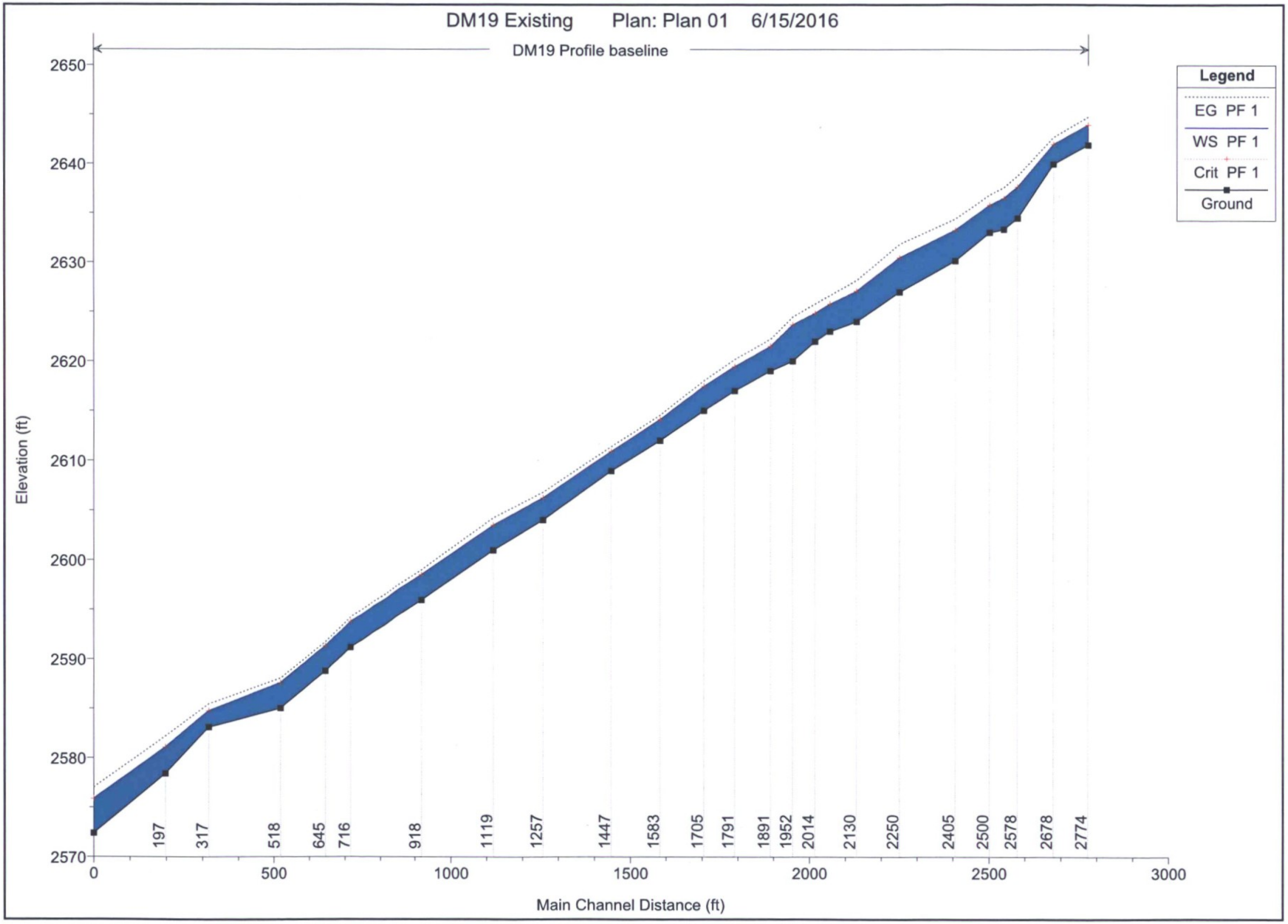
Scour Calculations

Erosion Hazard Setback Calculations

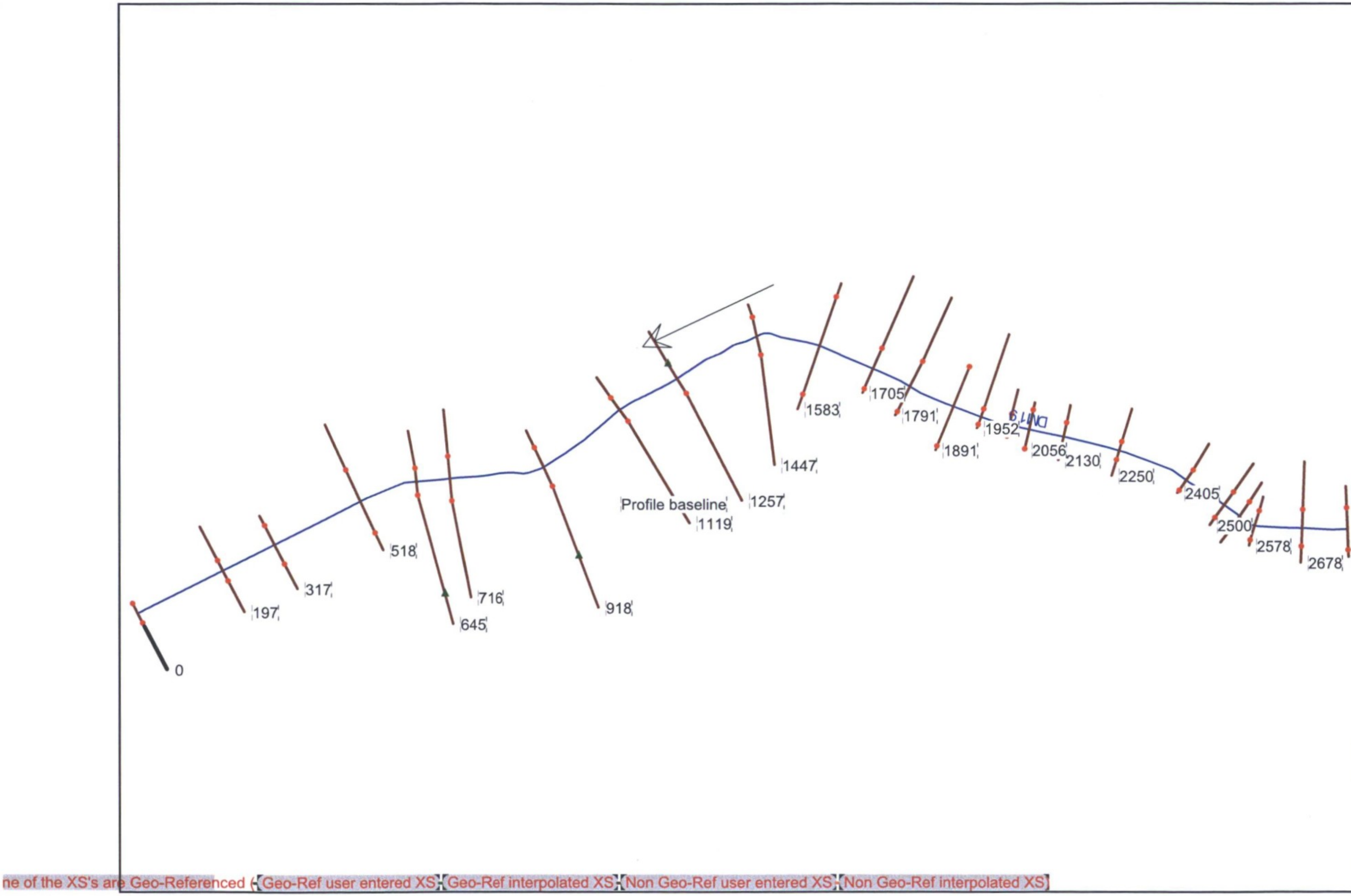
HEC-RAS Output Files Existing & Proposed Conditions

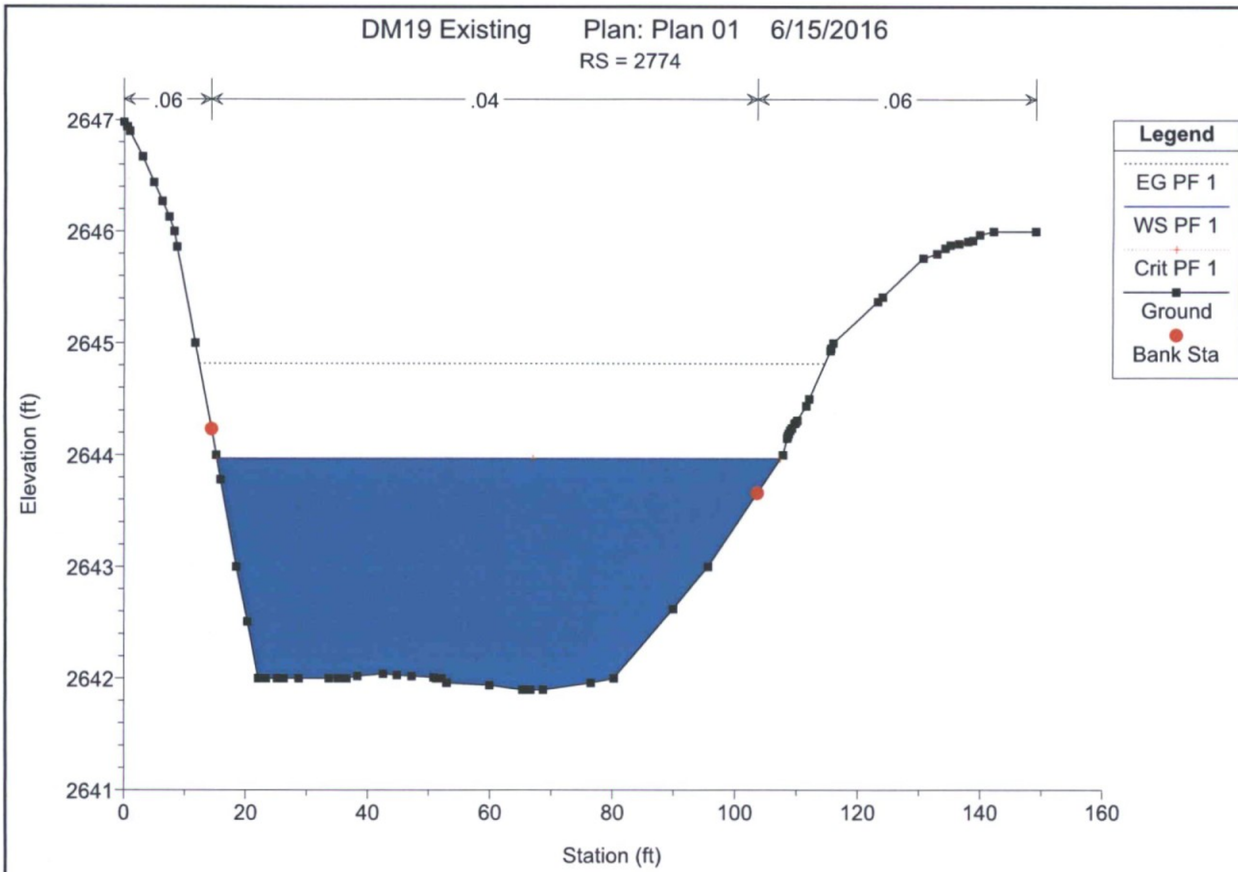
EXISTING

GALLOWAY WASH



DM19 Existing Plan: Plan 01 6/15/2016
DM19 Profile baseline
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
2650
2640
2630
2620
2610
2600
2590
2580
2570
197
317
518
645
716
918
1119
1257
1447
1583
1705
1791
1891
1952
2014
2130
2250
2405
2500
2578
2678
2774
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)


0
197
317
518
645
716
918
Profile baseline
1119
1257
1447
1583
1705
1791
1891
1952
2056
2130
2250
2405
2500
2578
2678
2774
ne of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)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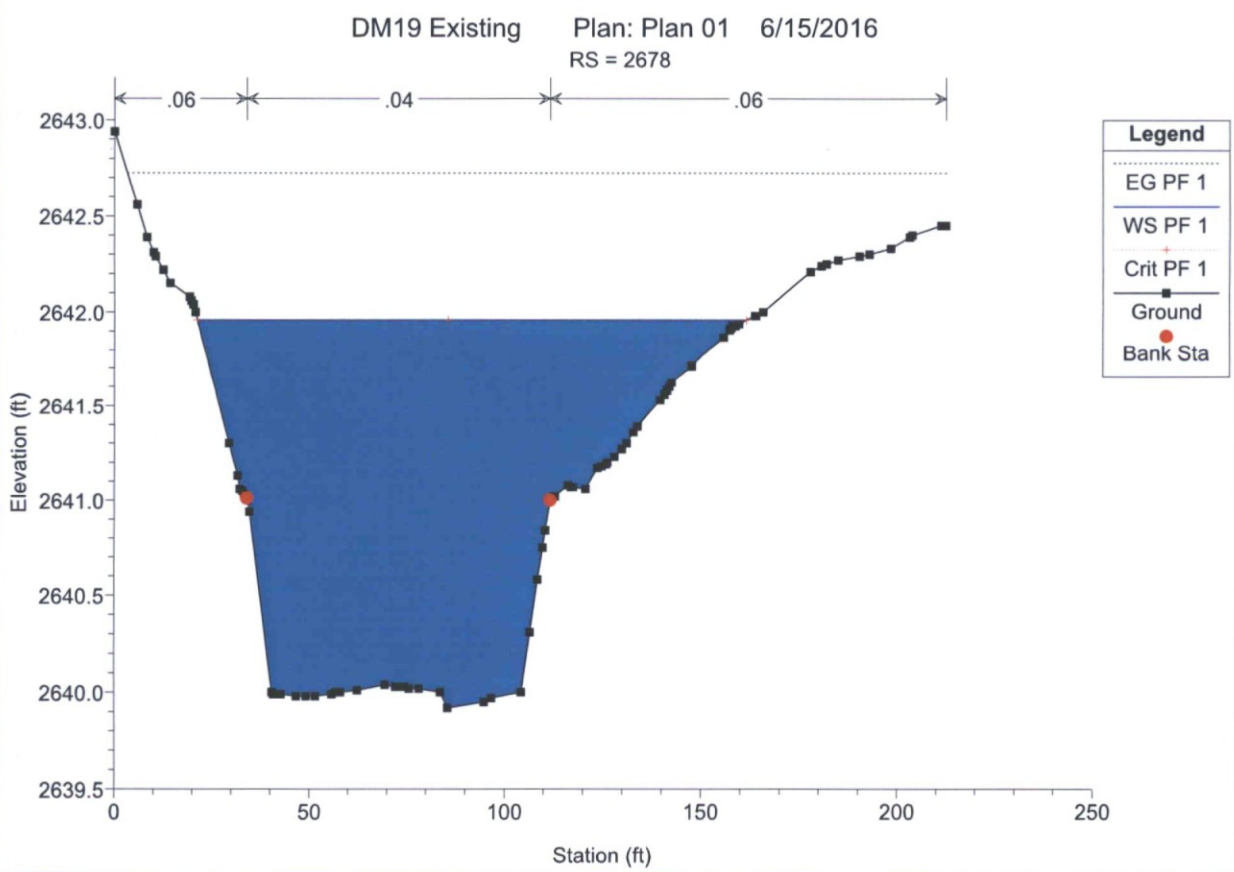
RS = 2774
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2641
2642
2643
2644
2645
2646
2647
0
20
40
60
80
100
120
140
160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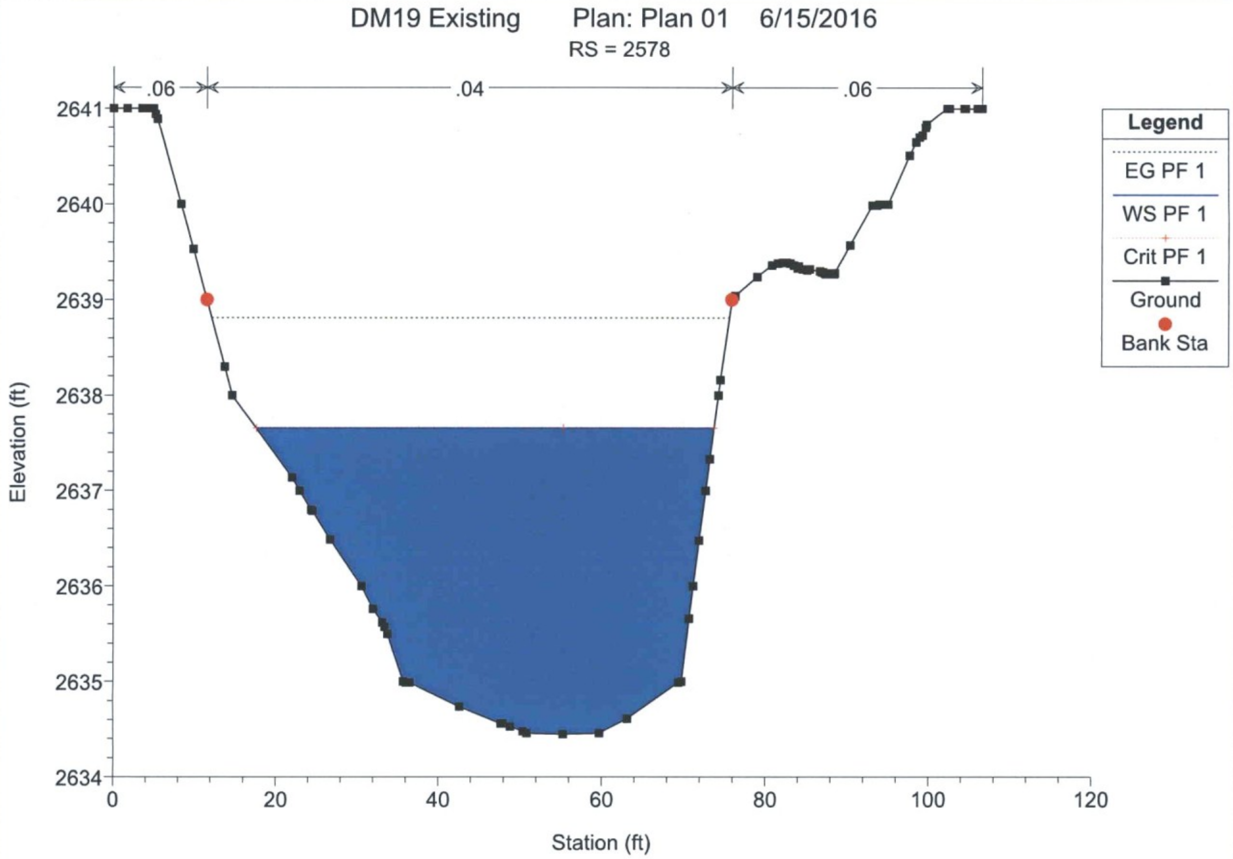
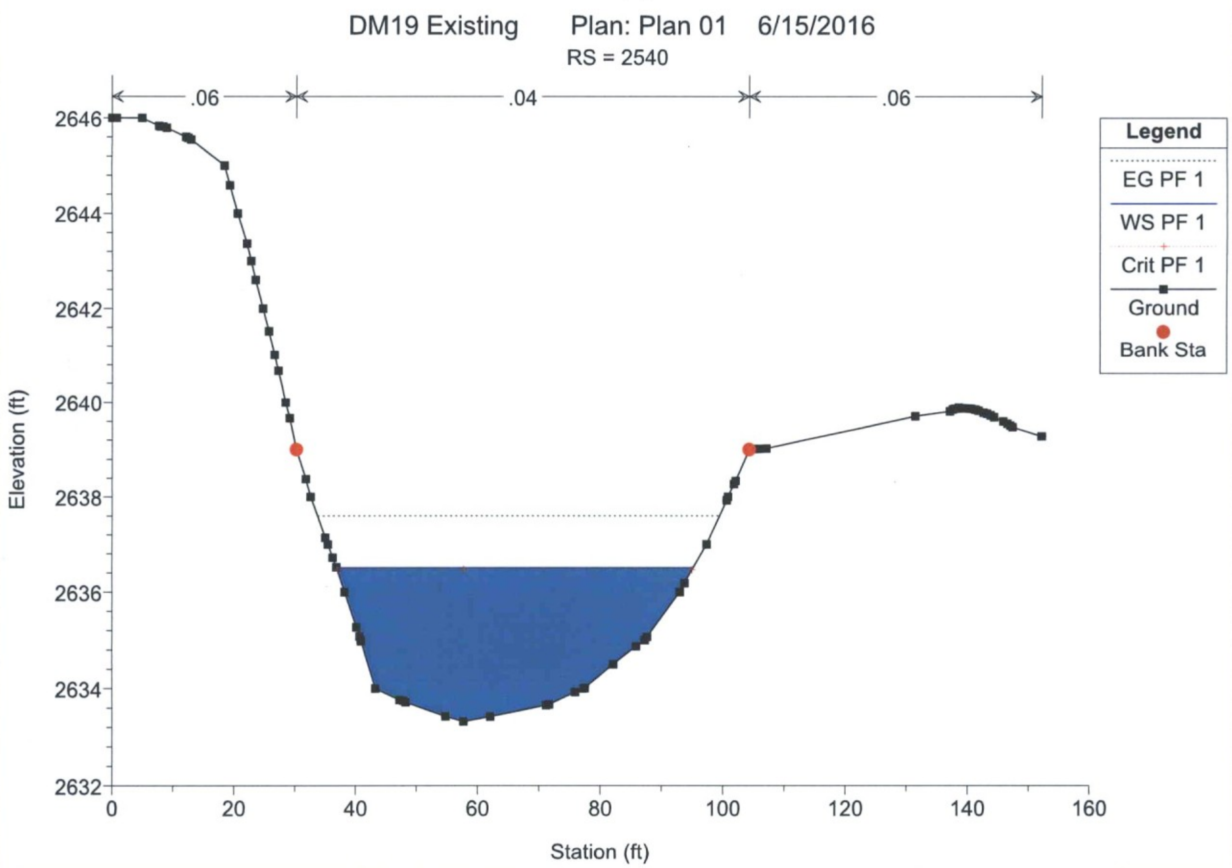
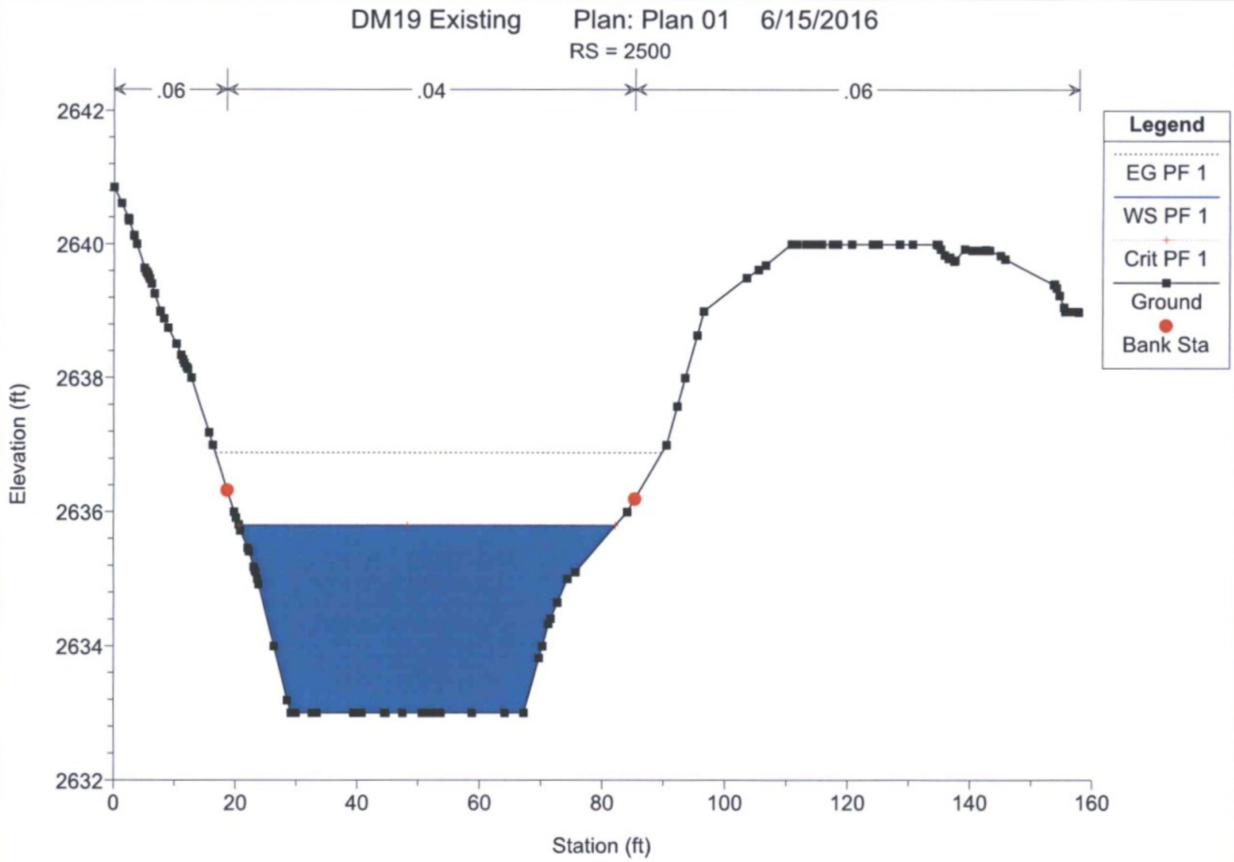
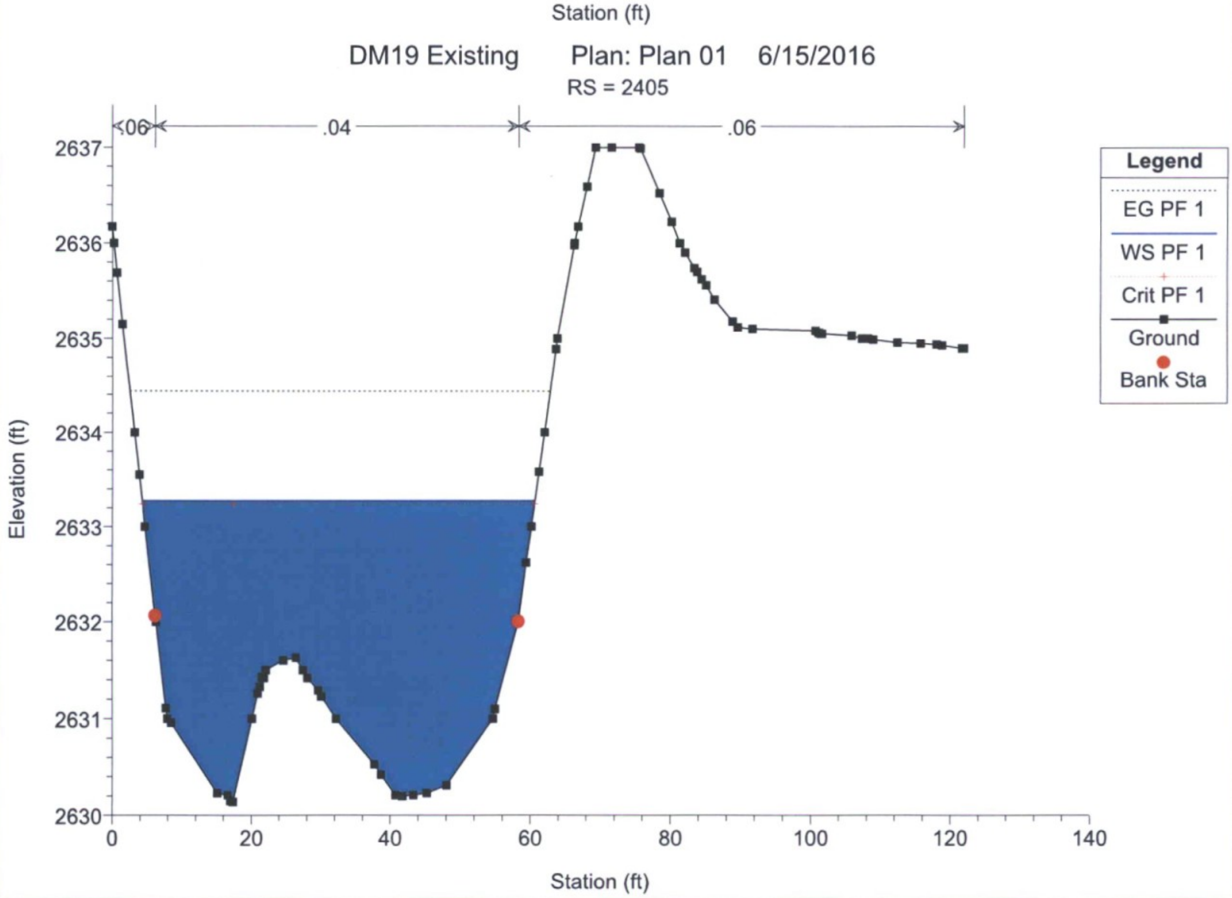
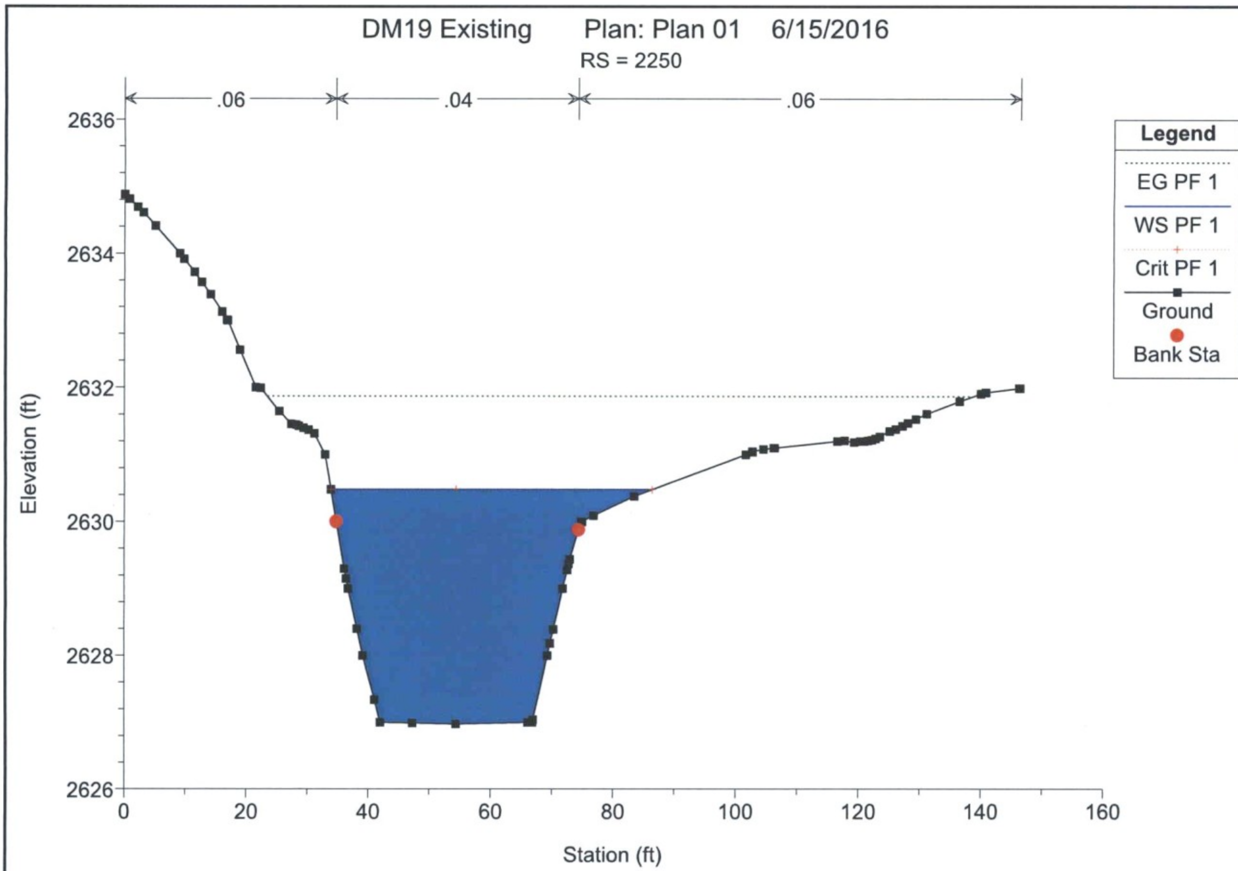
RS = 2678
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2639.5
2640.0
2640.5
2641.0
2641.5
2642.0
2642.5
2643.0
0
50
100
150
200
250

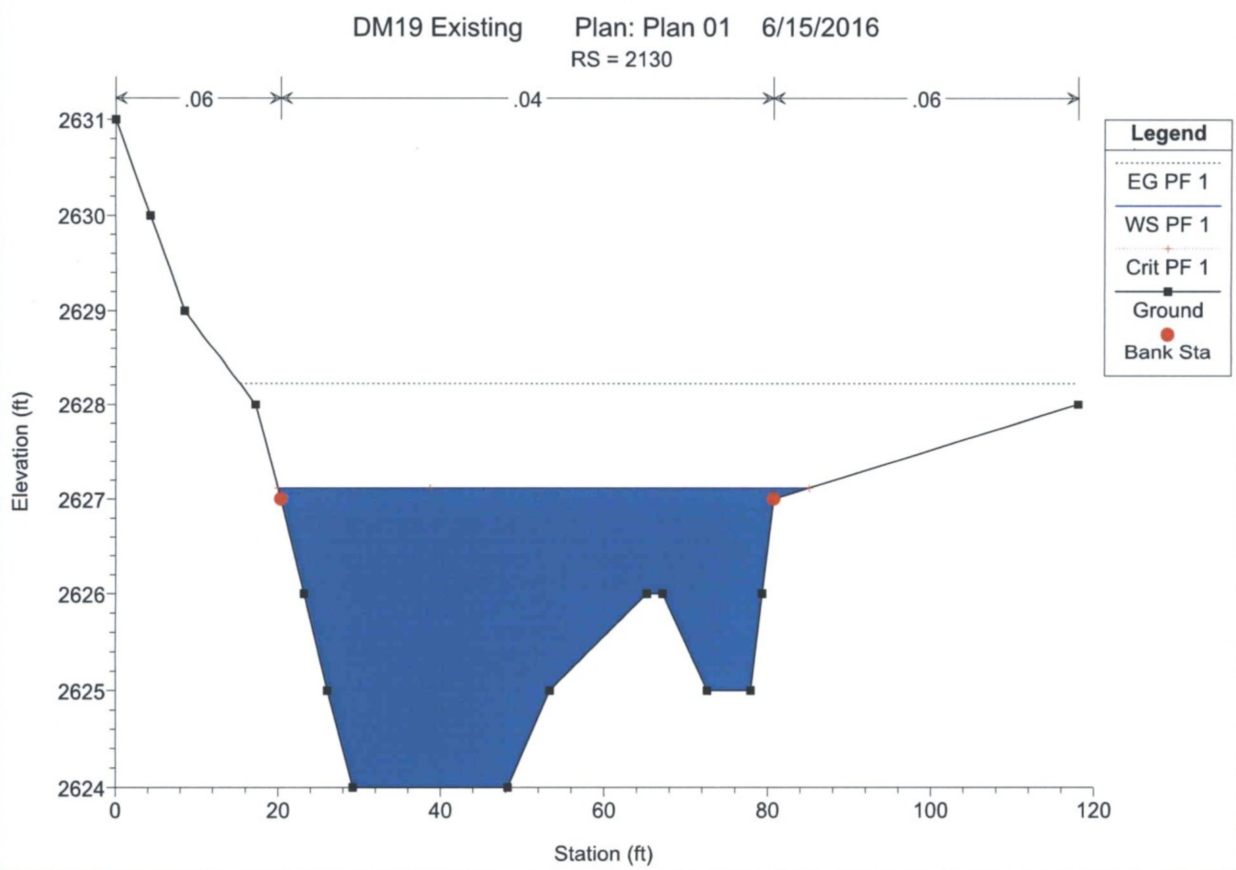

DM19 Existing Plan: Plan 01 6/15/2016
RS = 2578
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2641
2640
2639
2638
2637
2636
2635
2634
0
20
40
60
80
100
120

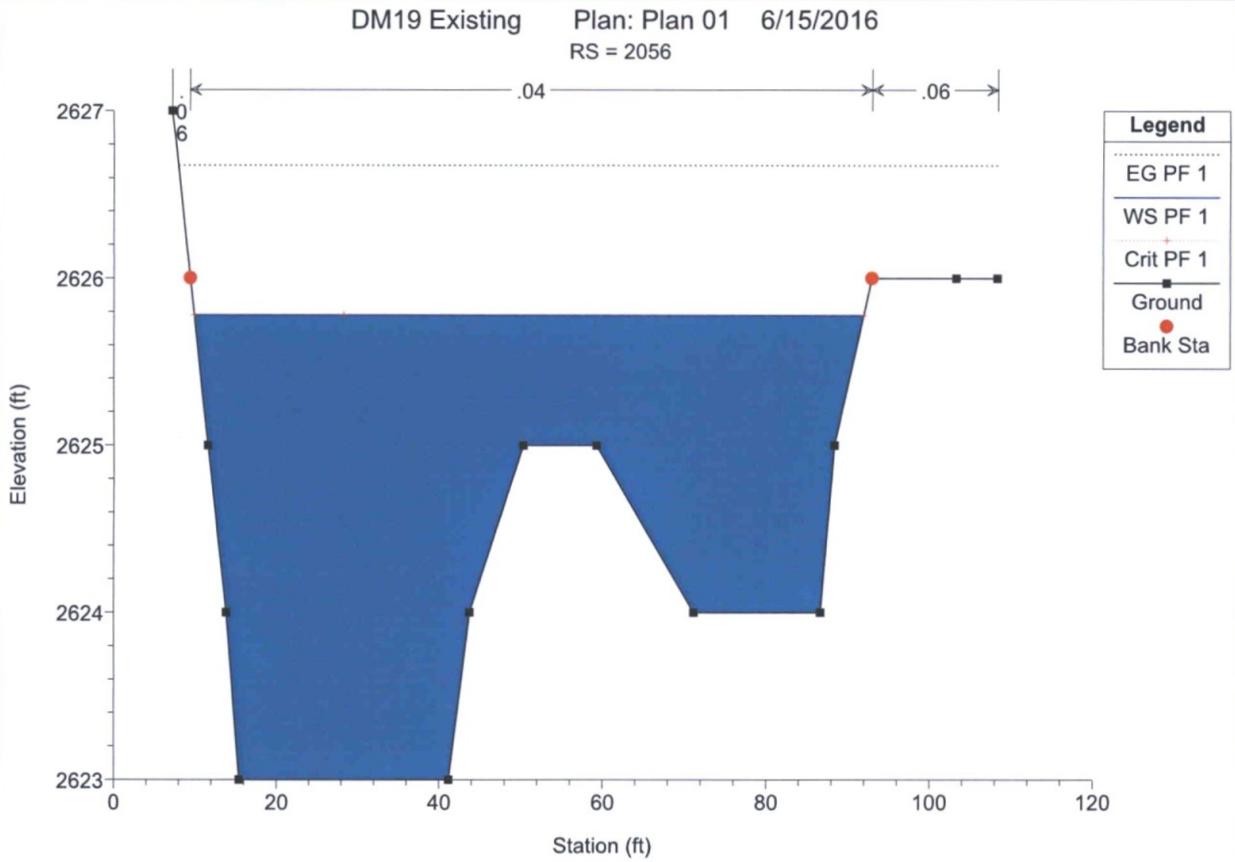

DM19 Existing Plan: Plan 01 6/15/2016
RS = 2540
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2646
2644
2642
2640
2638
2636
2634
2632
0
20
40
60
80
100
120
140
160

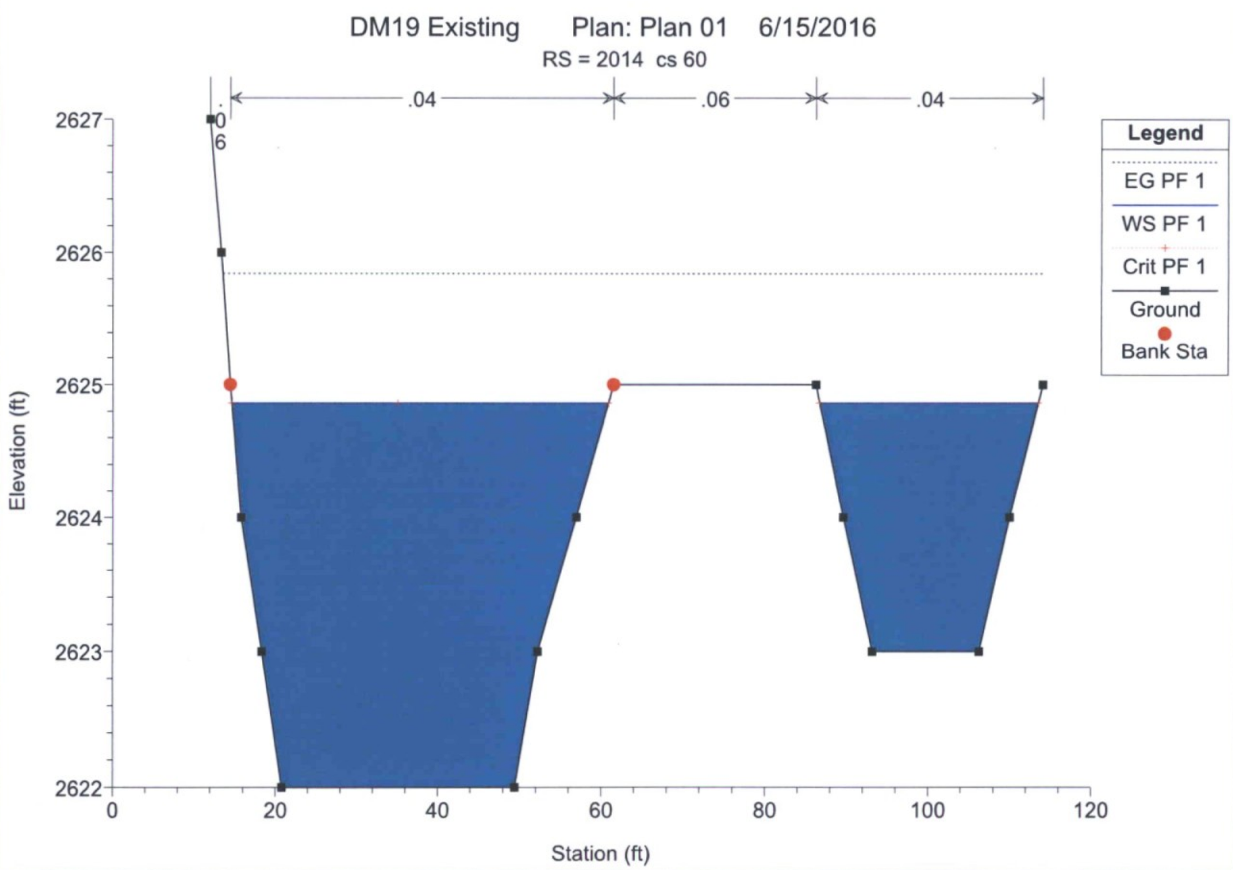

DM19 Existing Plan: Plan 01 6/15/2016
RS = 2500
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2642
2640
2638
2636
2634
2632
Station (ft)
0
20
40
60
80
100
120
140
160

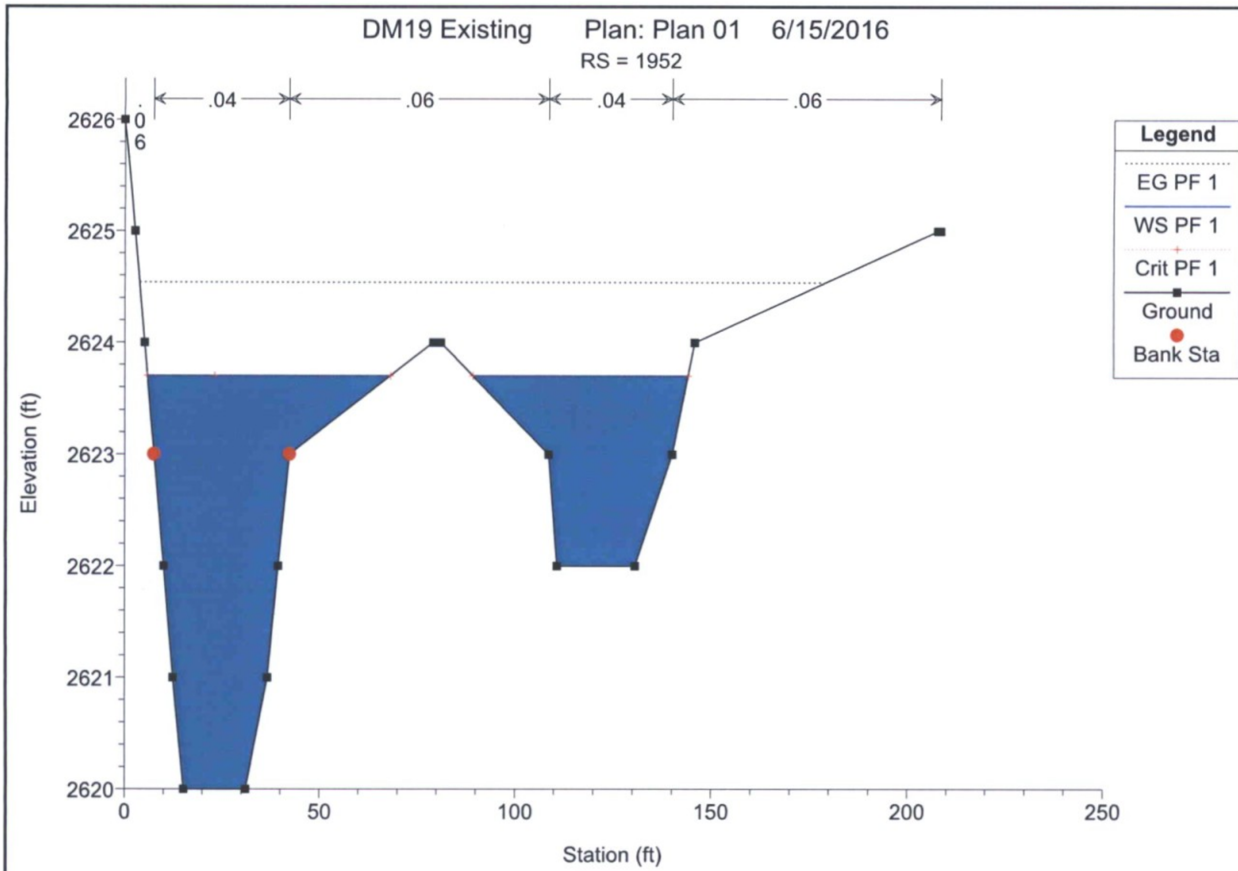

DM19 Existing Plan: Plan 01 6/15/2016
RS = 2405
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2637
2636
2635
2634
2633
2632
2631
2630
Station (ft)
0
20
40
60
80
100
120
140


DM19 Existing Plan: Plan 01 6/15/2016
RS = 2250
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2626
2628
2630
2632
2634
2636
0
20
40
60
80
100
120
140
160

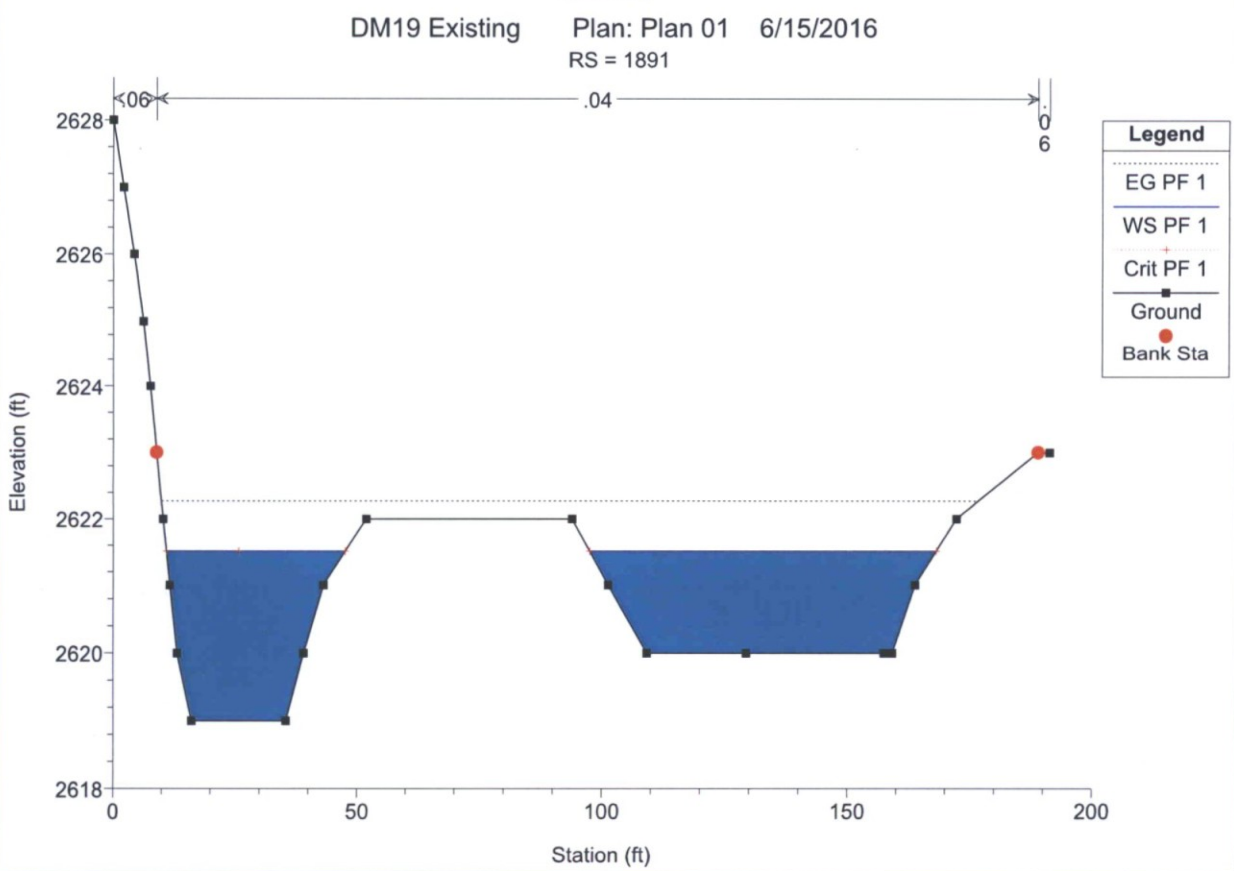

DM19 Existing Plan: Plan 01 6/15/2016
RS = 2130
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2624
2625
2626
2627
2628
2629
2630
2631
0
20
40
60
80
100
120


DM19 Existing Plan: Plan 01 6/15/2016
RS = 2056
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

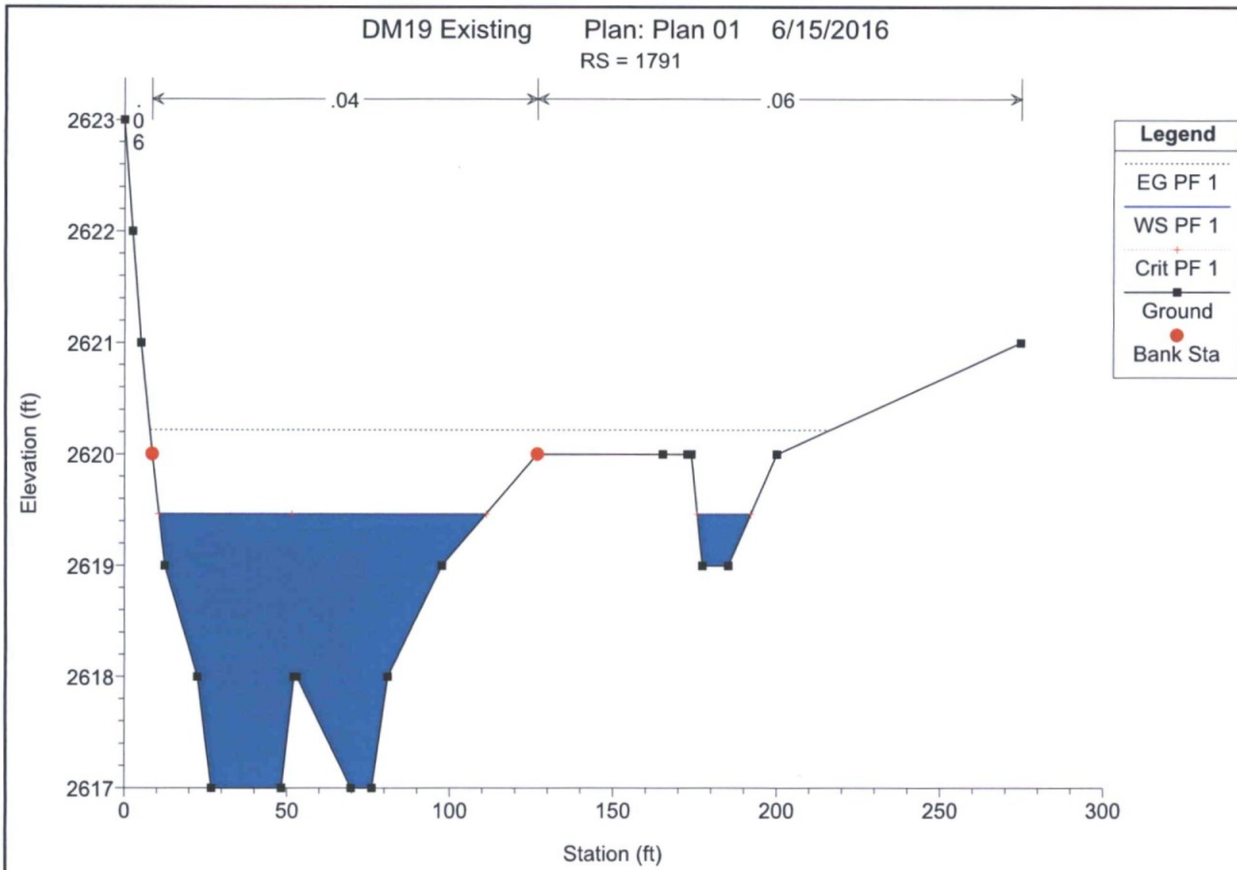

DM19 Existing Plan: Plan 01 6/15/2016
RS = 2014 cs 60
.04
.06
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

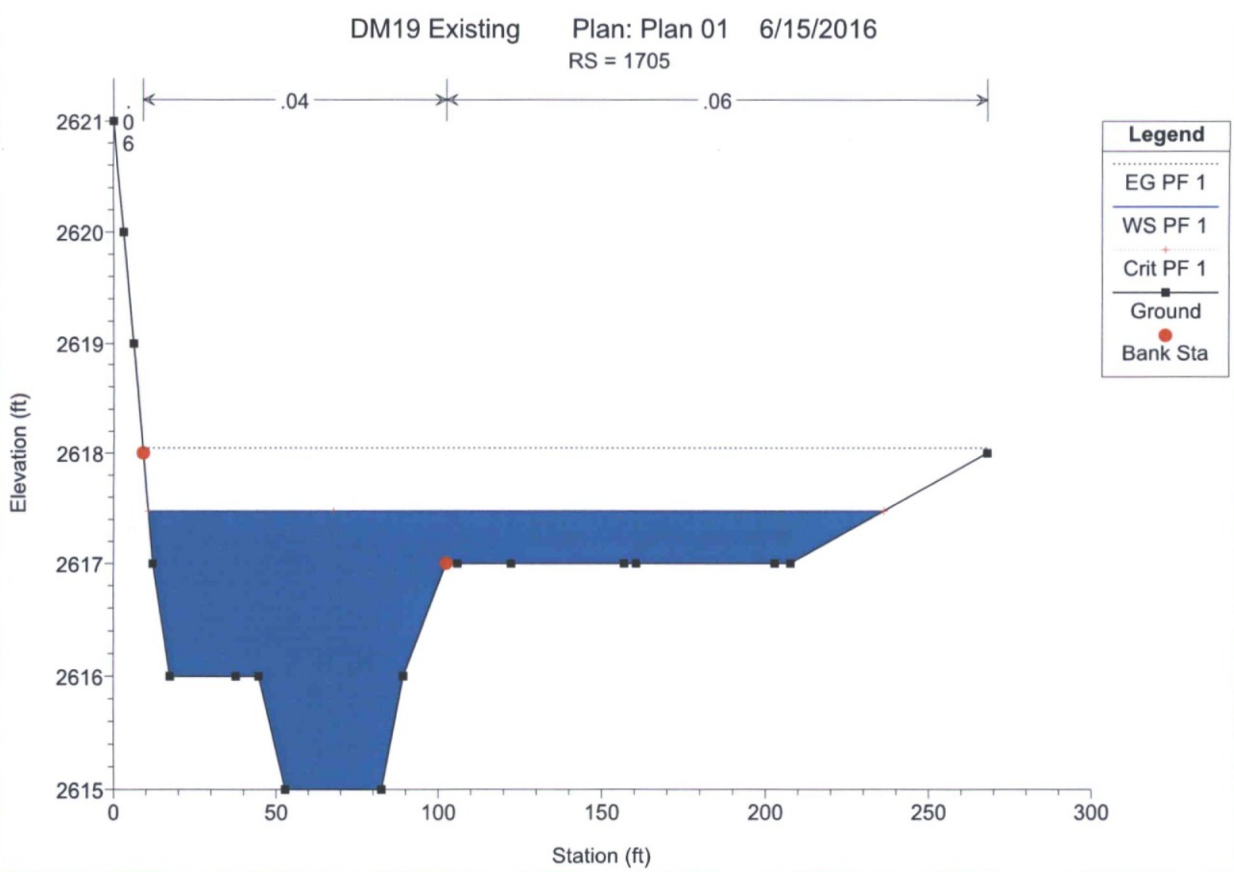


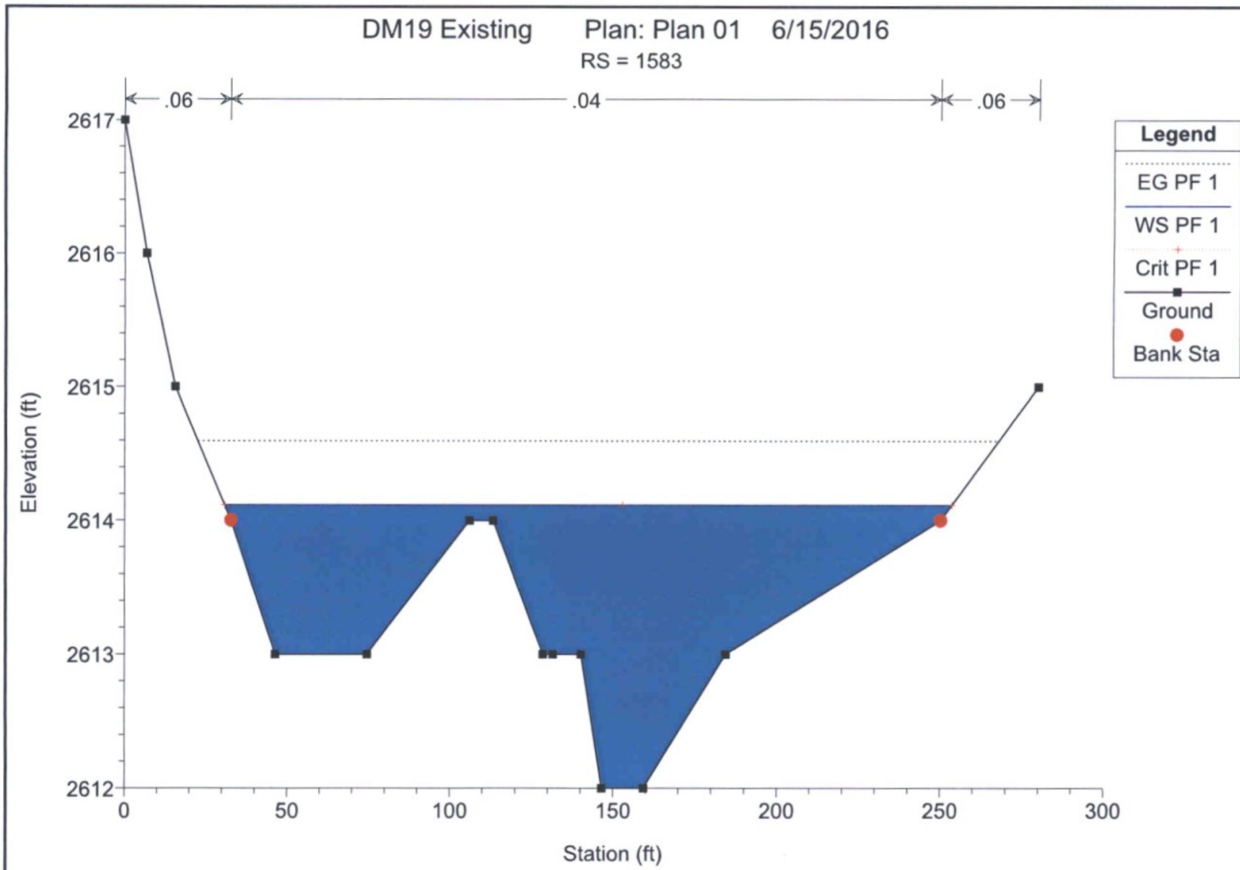
DM19 Existing Plan: Plan 01 6/15/2016
RS = 1952
.04
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)



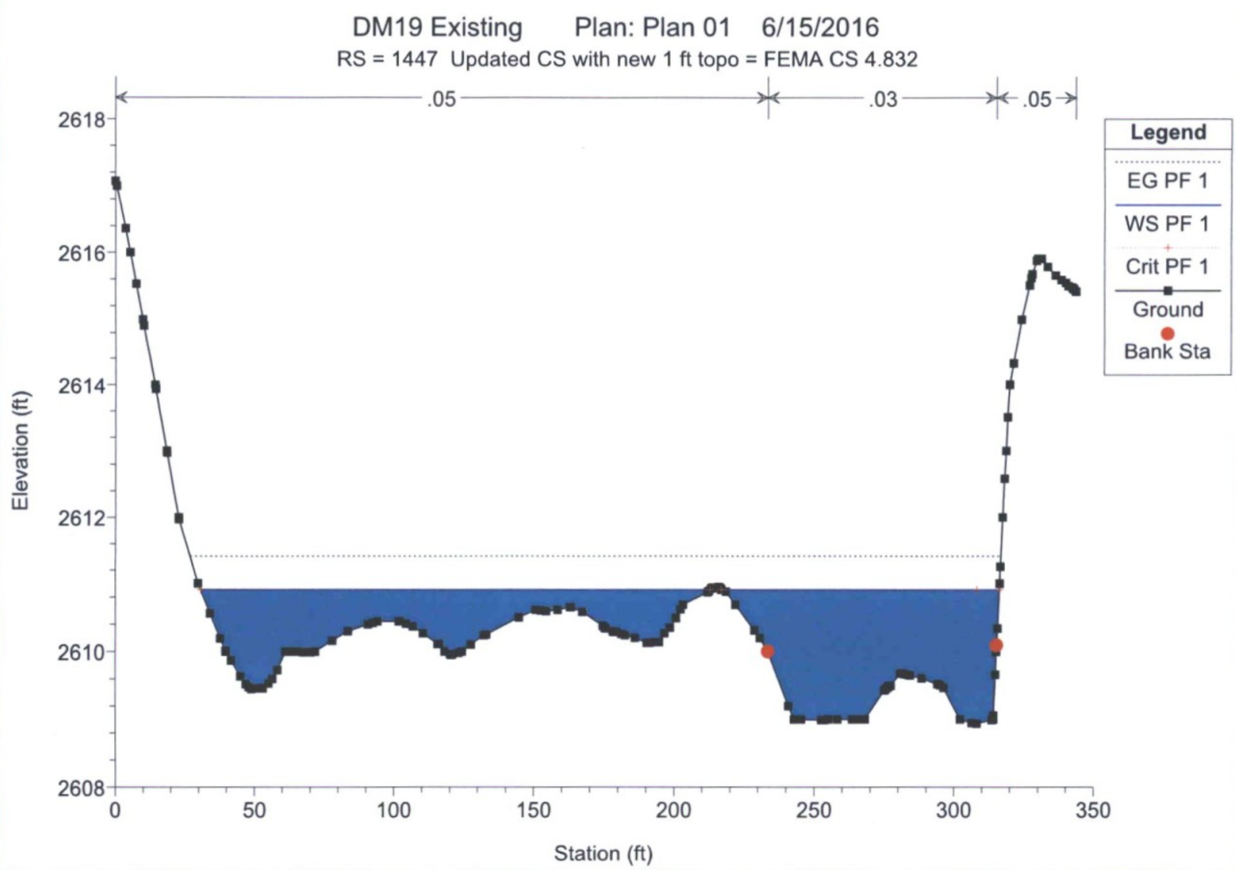
DM19 Existing Plan: Plan 01 6/15/2016
RS = 1891
.06
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


DM19 Existing Plan: Plan 01 6/15/2016
RS = 1791
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
0
6
2623
2622
2621
2620
2619
2618
2617
0
50
100
150
200
250
300

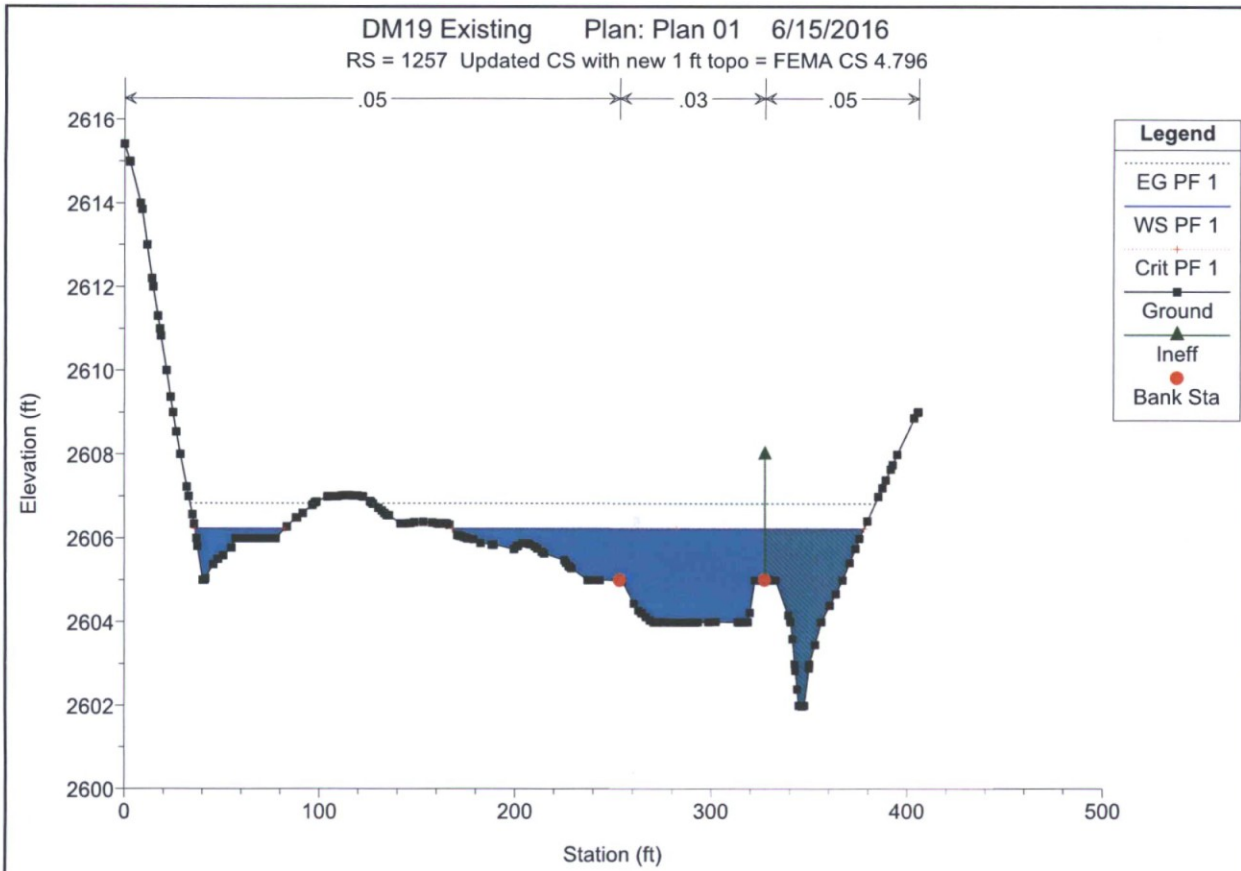

DM19 Existing Plan: Plan 01 6/15/2016
RS = 1705
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
0
6
2621
2620
2619
2618
2617
2616
2615
0
50
100
150
200
250
300



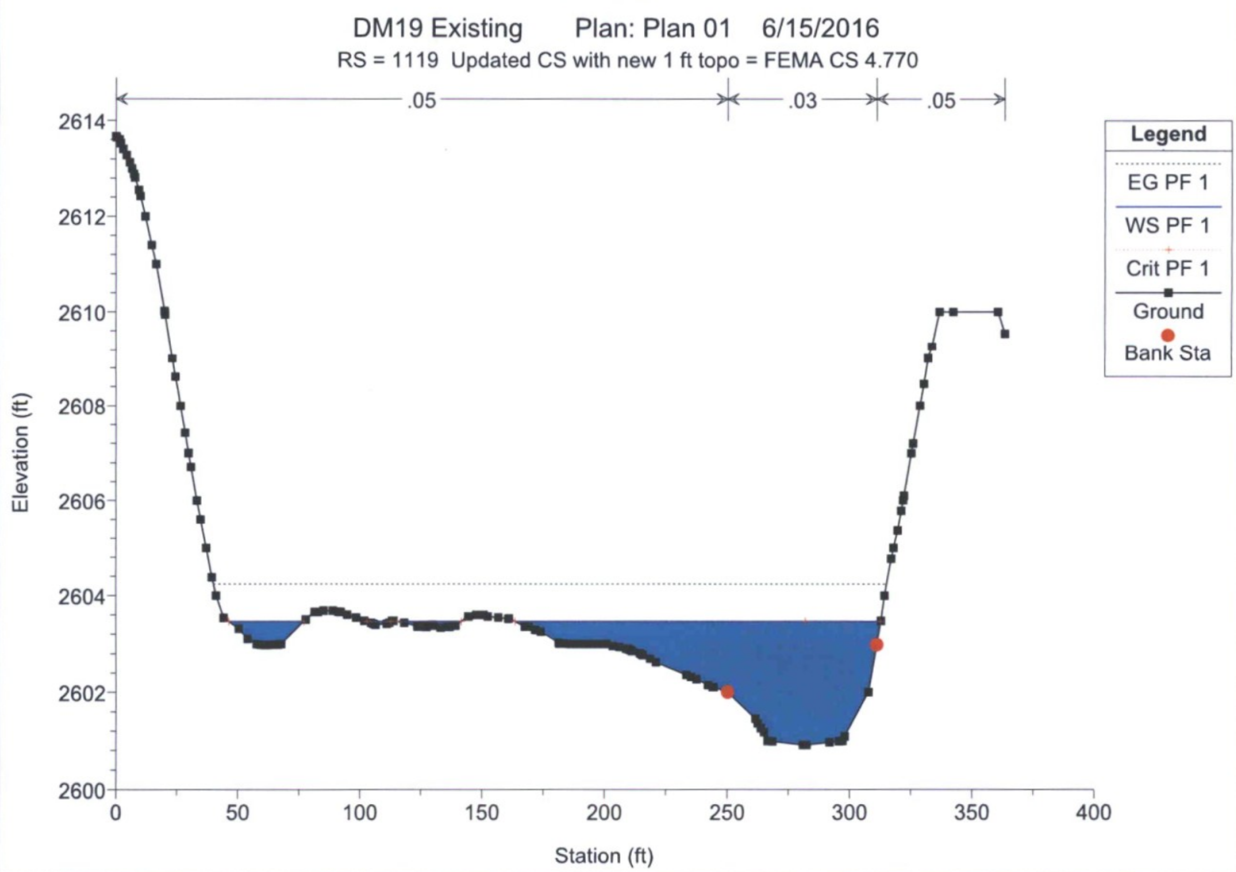
DM19 Existing Plan: Plan 01 6/15/2016
RS = 1583
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2617
2616
2615
2614
2613
2612
0
50
100
150
200
250
300
Station (ft)



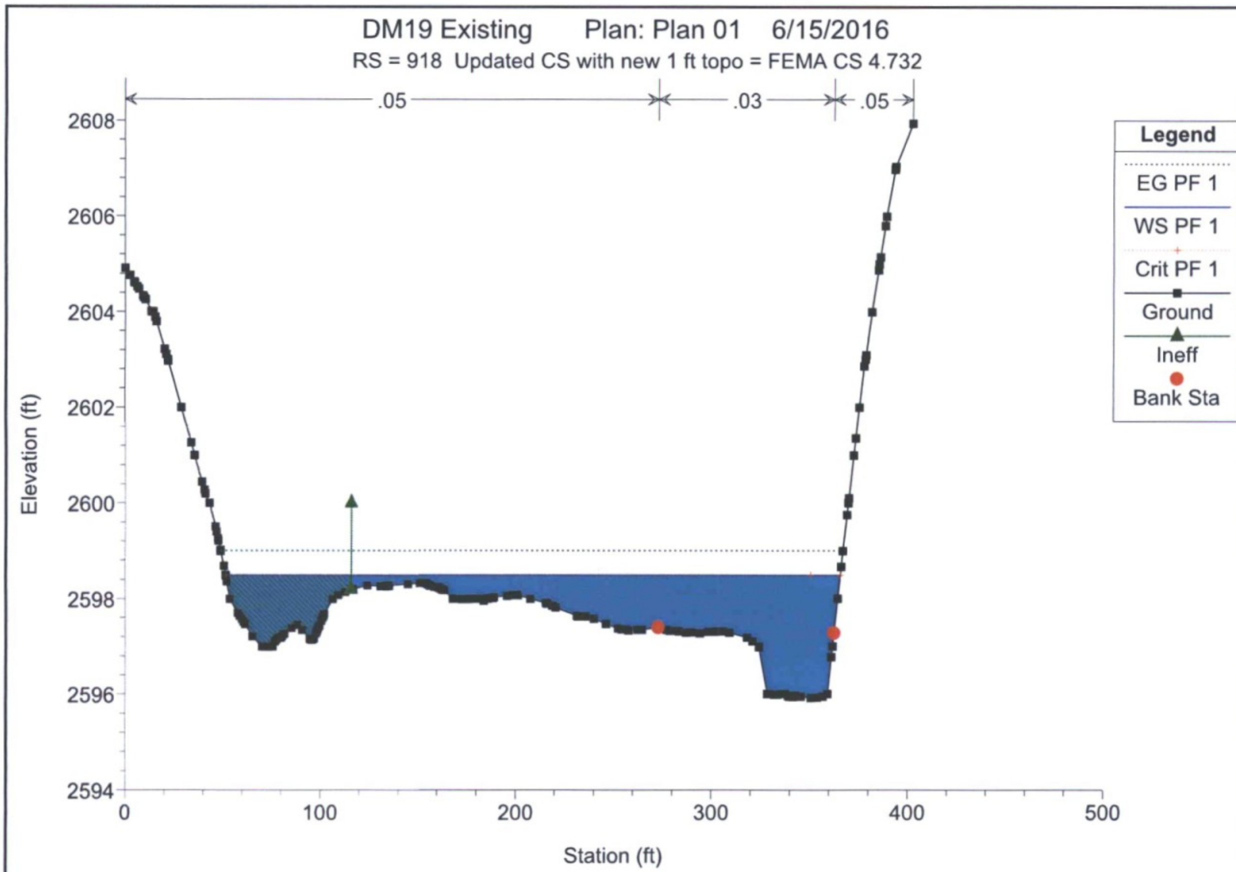
DM19 Existing Plan: Plan 01 6/15/2016
RS = 1447 Updated CS with new 1 ft topo = FEMA CS 4.832
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2618
2616
2614
2612
2610
2608
0
50
100
150
200
250
300
350
Station (ft)

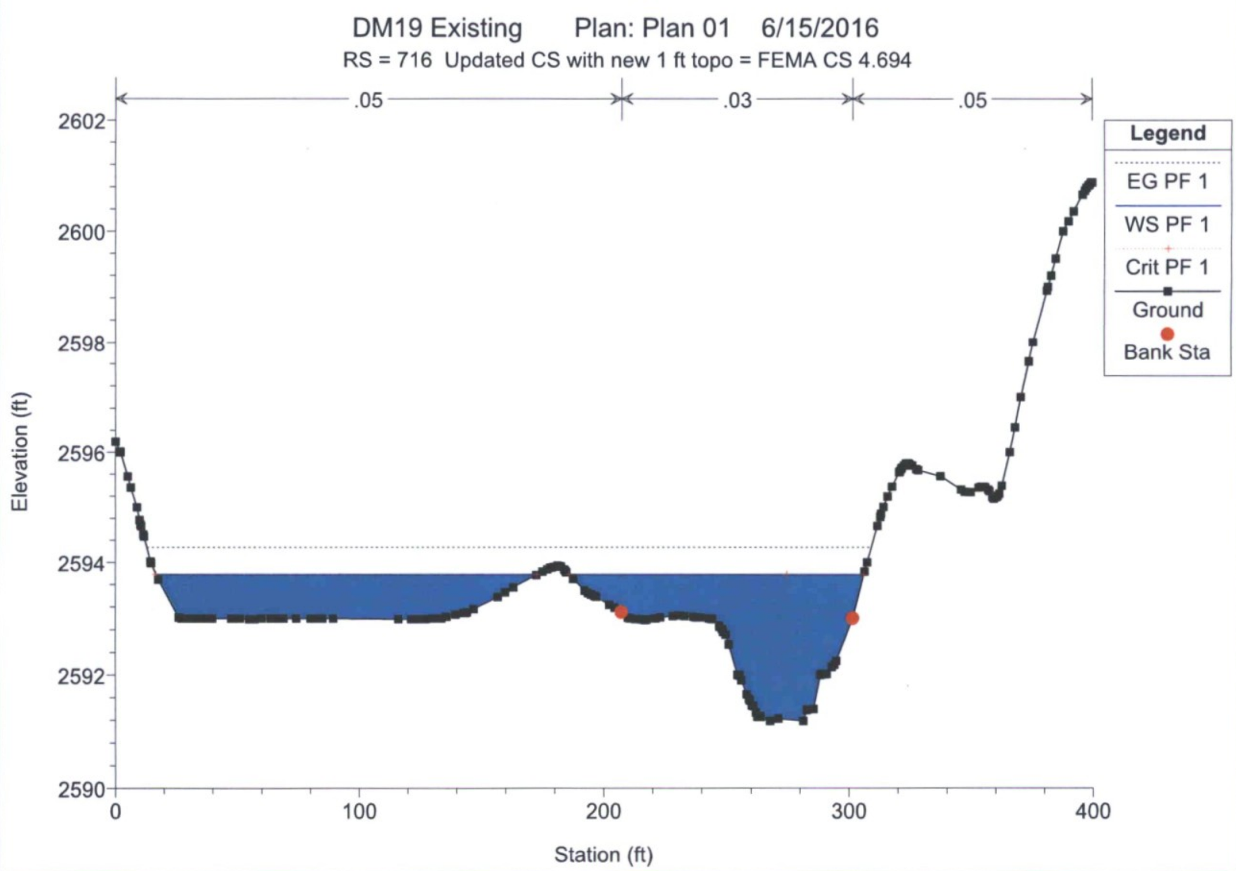


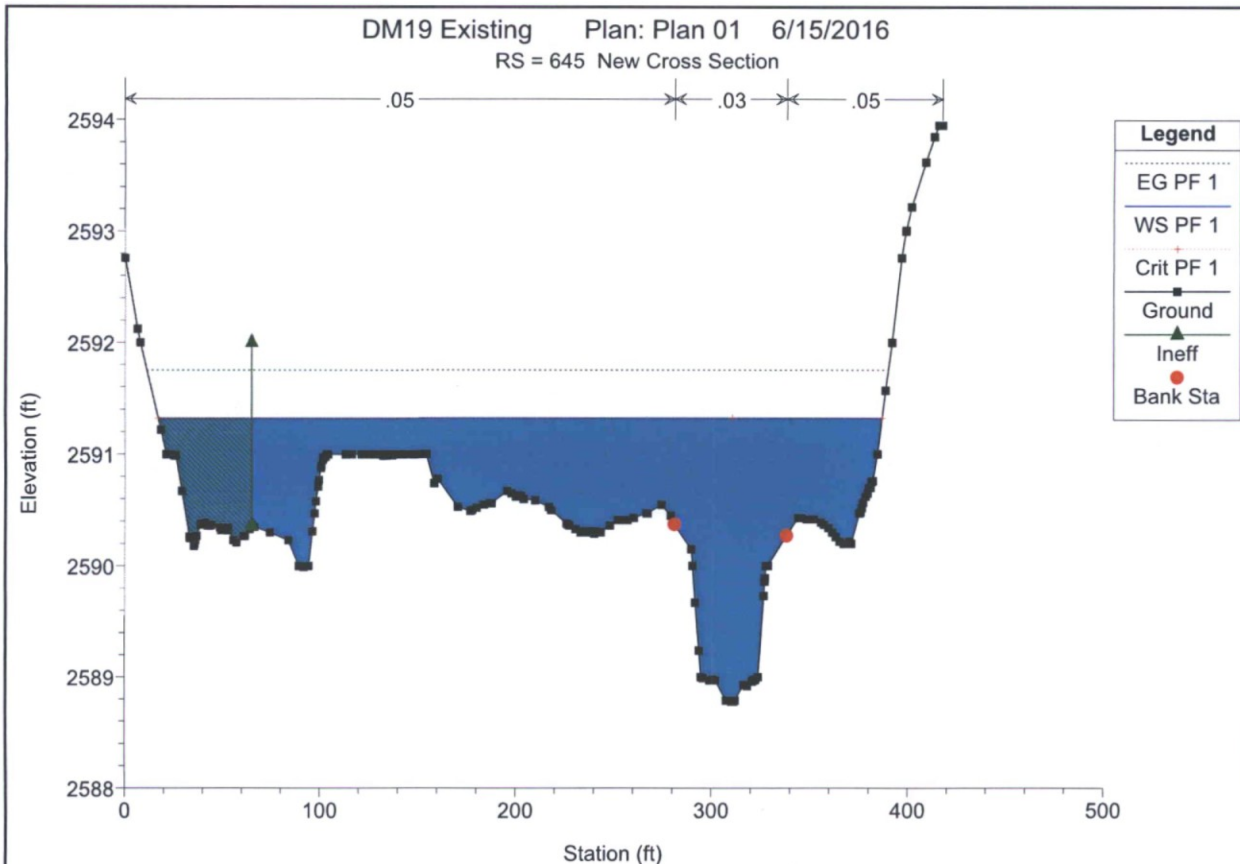
DM19 Existing Plan: Plan 01 6/15/2016
RS = 1257 Updated CS with new 1 ft topo = FEMA CS 4.796
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

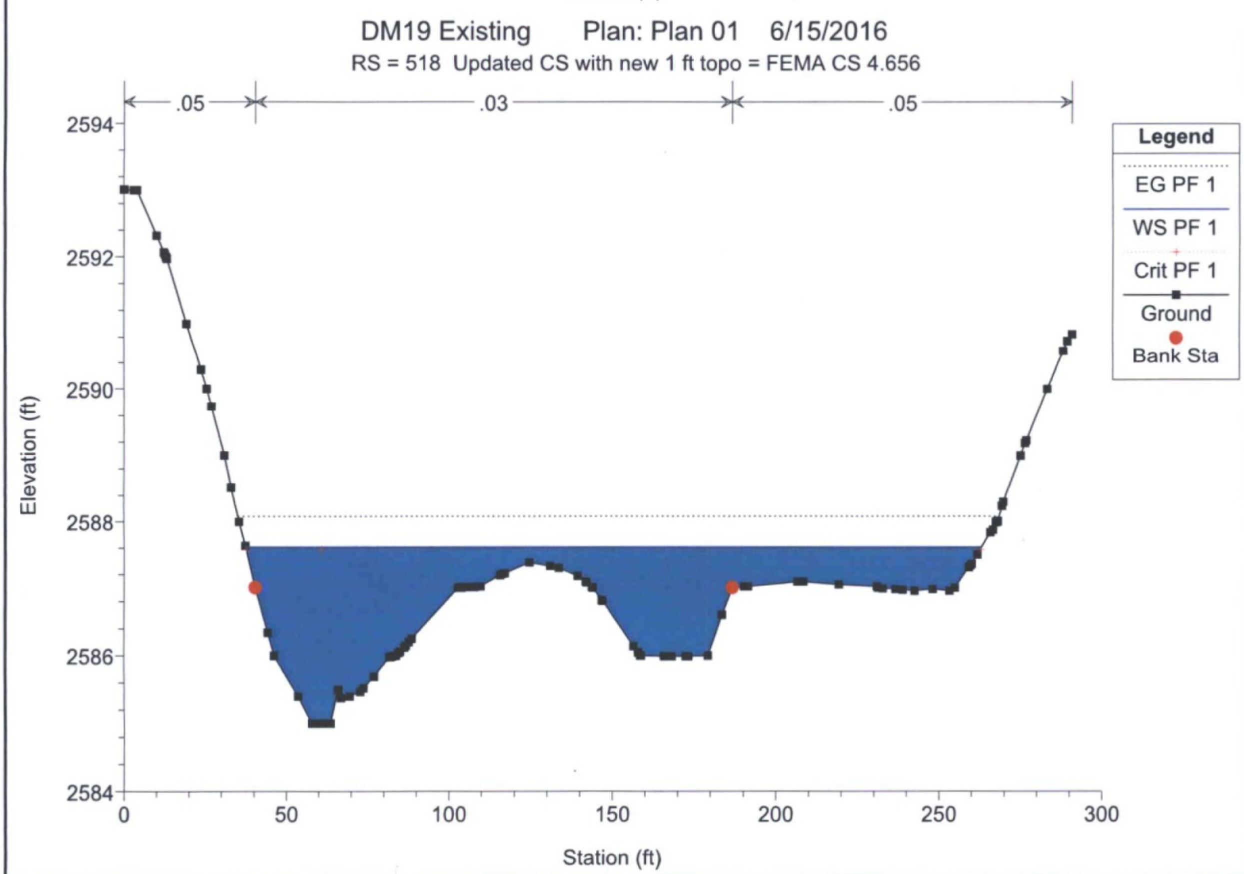


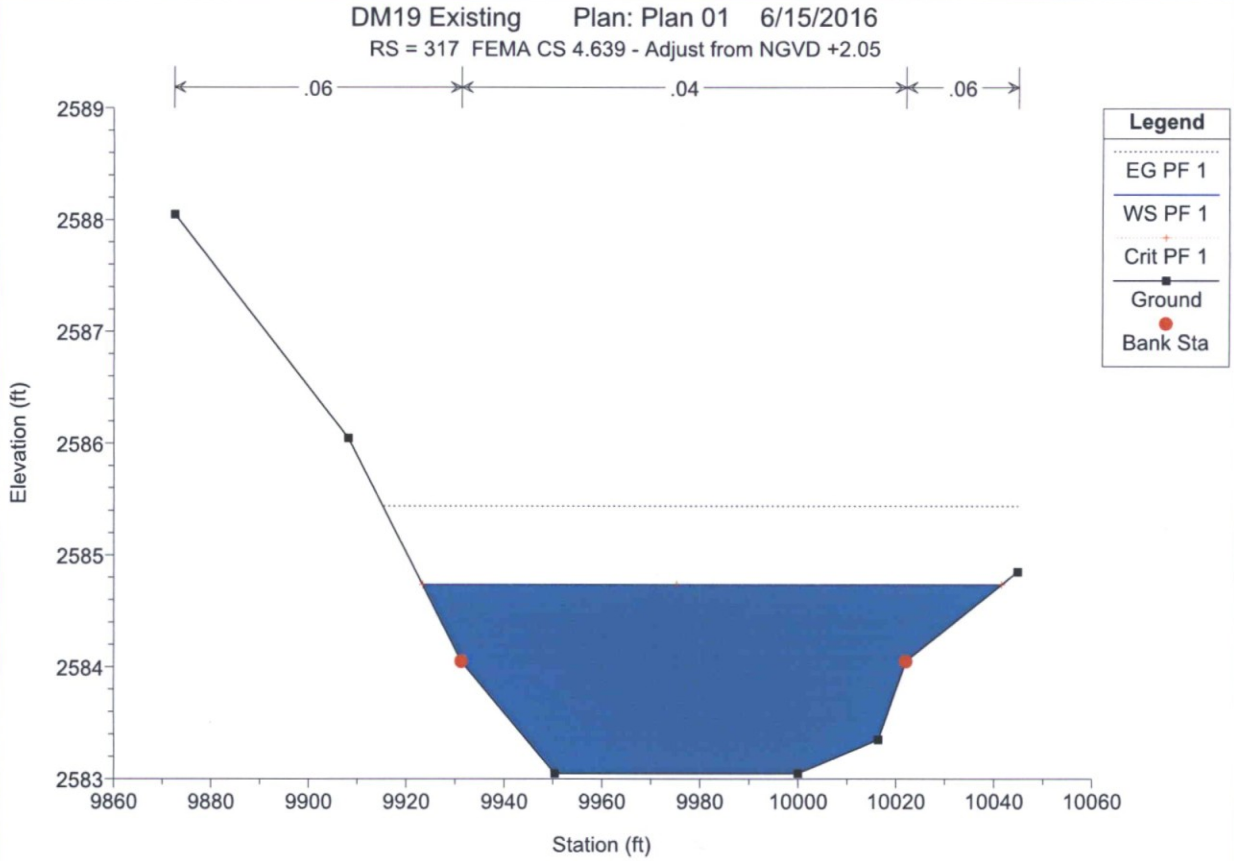
DM19 Existing Plan: Plan 01 6/15/2016
RS = 1119 Updated CS with new 1 ft topo = FEMA CS 4.770
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

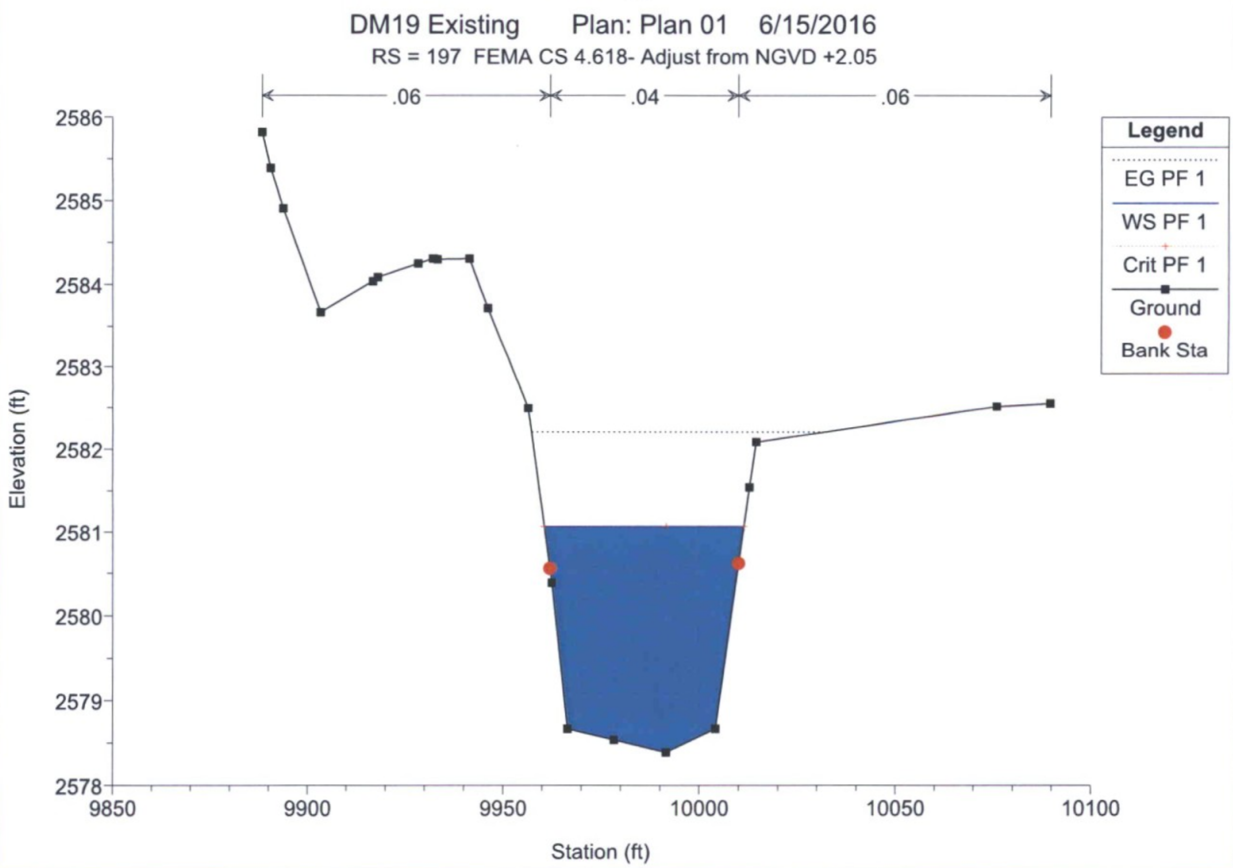

DM19 Existing Plan: Plan 01 6/15/2016
RS = 918 Updated CS with new 1 ft topo = FEMA CS 4.732
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2594
2596
2598
2600
2602
2604
2606
2608
0
100
200
300
400
500

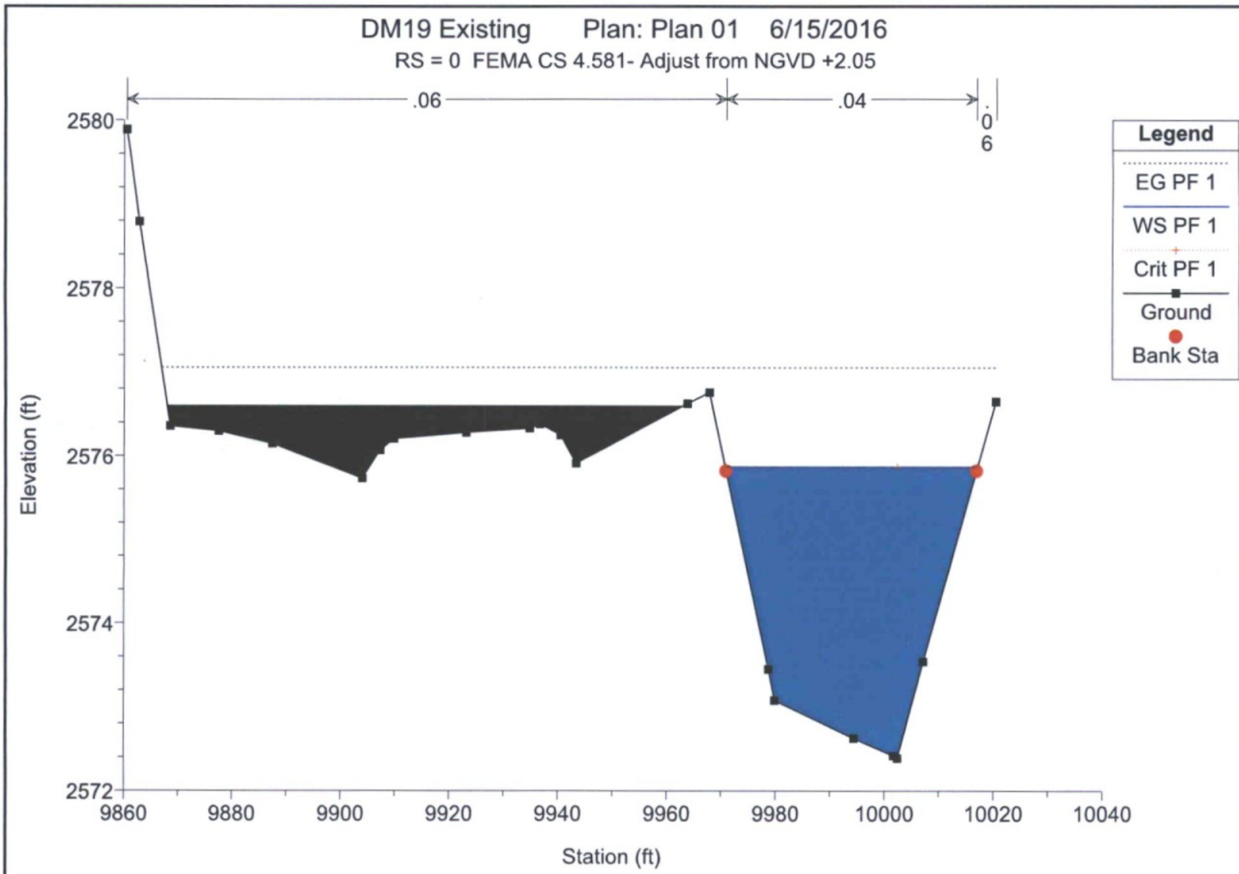

DM19 Existing Plan: Plan 01 6/15/2016
RS = 716 Updated CS with new 1 ft topo = FEMA CS 4.694
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2590
2592
2594
2596
2598
2600
2602
0
100
200
300
400


DM19 Existing Plan: Plan 01 6/15/2016
RS = 645 New Cross Section
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
2594
2593
2592
2591
2590
2589
2588
0
100
200
300
400
500
Station (ft)


DM19 Existing Plan: Plan 01 6/15/2016
RS = 518 Updated CS with new 1 ft topo = FEMA CS 4.656
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2594
2592
2590
2588
2586
2584
0
50
100
150
200
250
300
Station (ft)


DM19 Existing Plan: Plan 01 6/15/2016
RS = 317 FEMA CS 4.639 - Adjust from NGVD +2.05
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2589
2588
2587
2586
2585
2584
2583
9860
9880
9900
9920
9940
9960
9980
10000
10020
10040
10060
Station (ft)


DM19 Existing Plan: Plan 01 6/15/2016
RS = 197 FEMA CS 4.618- Adjust from NGVD +2.05
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2586
2585
2584
2583
2582
2581
2580
2579
2578
9850
9900
9950
10000
10050
10100
Station (ft)



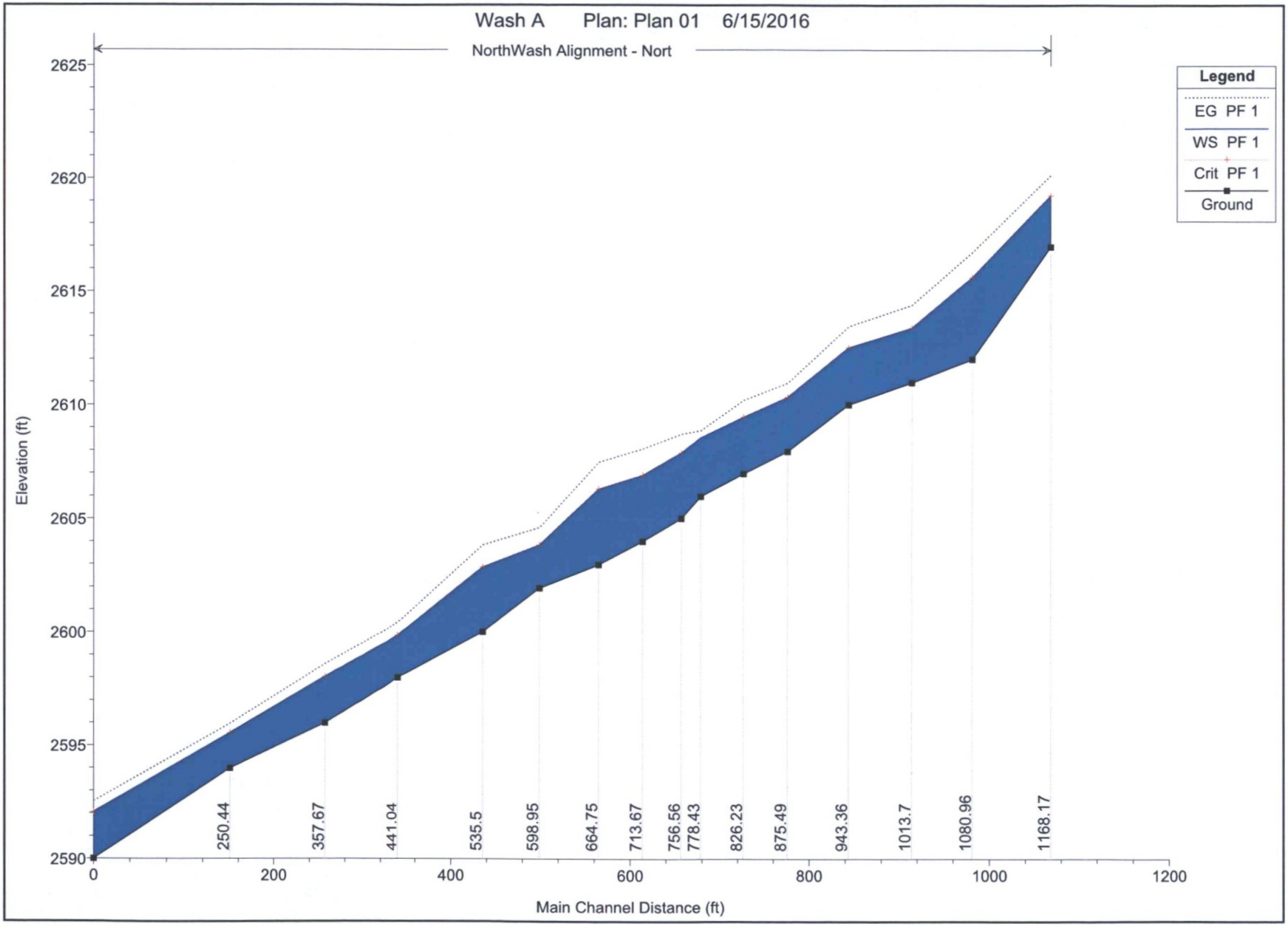
DM19 Existing Plan: Plan 01 6/15/2016
RS = 0 FEMA CS 4.581- Adjust from NGVD +2.05
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2580
2578
2576
2574
2572
9860
9880
9900
9920
9940
9960
9980
10000
10020
10040
Station (ft)

HEC-RAS Plan: Plan 01 River: DM19 Reach: Profile baseline Profile: PF 1

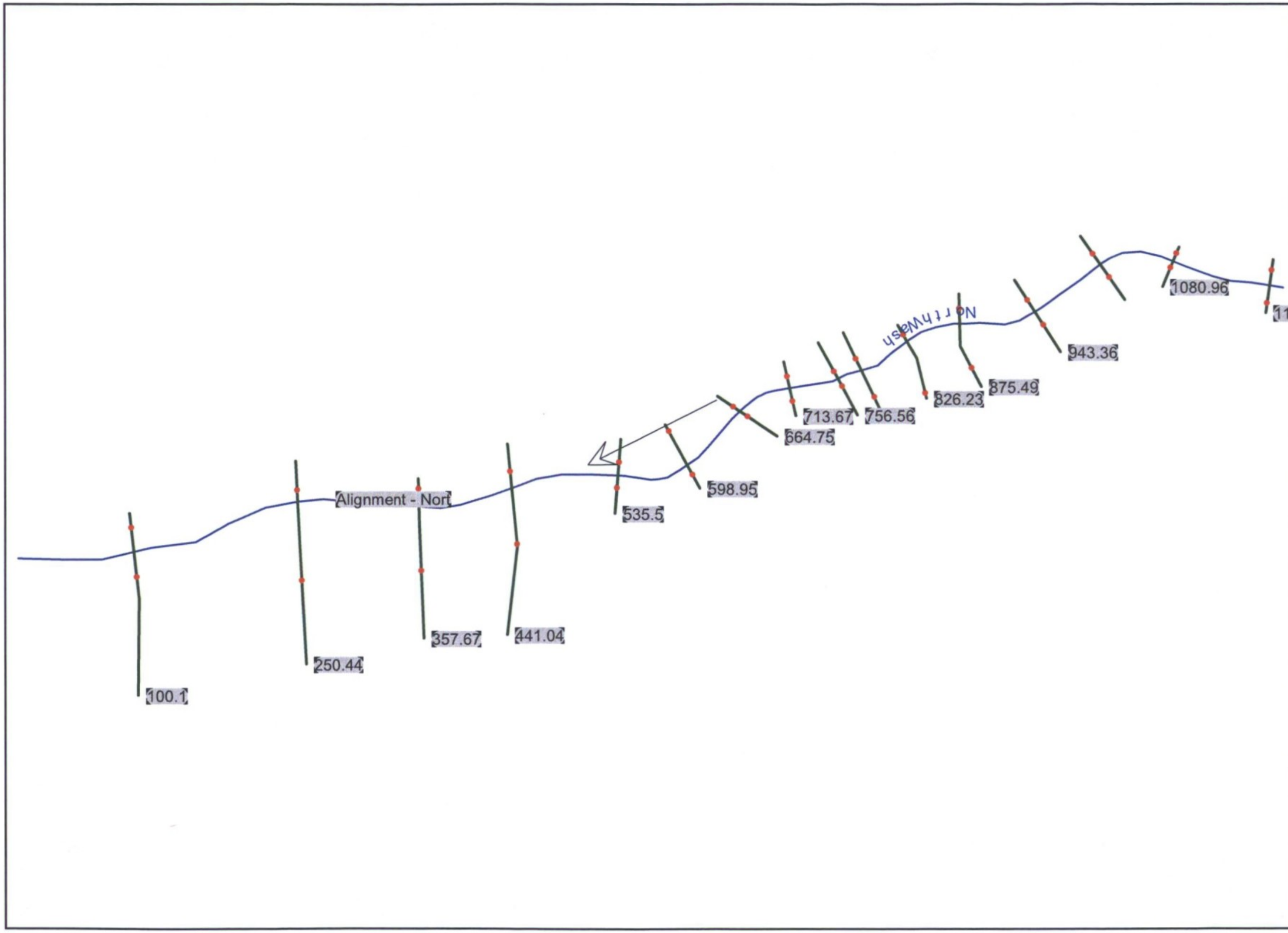
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Profile baseline	2774	1111.00	2641.90	2643.97	2643.97	2644.81	0.019573	7.39	150.93	92.16	1.00
Profile baseline	2678	1111.00	2639.92	2641.96	2641.96	2642.72	0.016336	7.21	176.81	140.34	0.93
Profile baseline	2578	1111.00	2634.45	2637.66	2637.66	2638.81	0.018331	8.64	128.65	56.14	1.01
Profile baseline	2540	1111.00	2633.32	2636.51	2636.47	2637.60	0.017260	8.38	132.63	58.28	0.98
Profile baseline	2500	1111.00	2633.00	2635.79	2635.79	2636.88	0.018543	8.37	132.70	61.54	1.00
Profile baseline	2405	1111.00	2630.14	2633.27	2633.24	2634.43	0.016829	8.67	130.22	56.37	0.98
Profile baseline	2250	1111.00	2626.98	2630.48	2630.48	2631.87	0.015983	9.48	119.91	52.49	0.97
Profile baseline	2130	1111.00	2624.00	2627.12	2627.12	2628.22	0.018673	8.42	132.18	65.10	1.00
Profile baseline	2056	1111.00	2623.00	2625.78	2625.78	2626.68	0.019778	7.60	146.23	82.05	1.00
Profile baseline	2014	1111.00	2622.00	2624.86	2624.86	2625.84	0.017091	8.35	143.71	73.05	0.97
Profile baseline	1952	1111.00	2620.00	2623.70	2623.70	2624.54	0.011525	8.10	169.11	117.24	0.83
Profile baseline	1891	1111.00	2619.00	2621.51	2621.51	2622.27	0.021132	6.97	159.31	107.40	1.01
Profile baseline	1791	1111.00	2617.00	2619.46	2619.46	2620.22	0.019554	6.99	163.30	116.96	0.98
Profile baseline	1705	1111.00	2615.00	2617.47	2617.47	2618.05	0.013724	6.32	217.73	225.56	0.84
Profile baseline	1583	1119.00	2612.00	2614.11	2614.11	2614.60	0.025216	5.58	200.71	222.84	1.02
Profile baseline	1447	1119.00	2608.94	2610.91	2610.91	2611.41	0.008431	6.36	261.67	281.66	0.87
Profile baseline	1257	1119.00	2603.99	2606.23	2606.23	2606.83	0.006824	6.57	226.00	256.00	0.81
Profile baseline	1119	1119.00	2600.92	2603.47	2603.47	2604.24	0.008223	7.49	202.58	215.74	0.90
Profile baseline	918	1119.00	2595.92	2598.49	2598.49	2599.01	0.007552	6.18	246.50	314.23	0.83
Profile baseline	716	1124.00	2591.19	2593.78	2593.78	2594.27	0.009506	6.27	254.38	276.24	0.91
Profile baseline	645	1124.00	2588.78	2591.32	2591.32	2591.75	0.007358	6.47	308.55	369.92	0.83
Profile baseline	518	1124.00	2585.00	2587.61	2587.58	2588.08	0.009846	5.69	226.02	225.58	0.90
Profile baseline	317	947.00	2583.05	2584.74	2584.74	2585.44	0.019229	6.79	146.67	118.24	0.97
Profile baseline	197	947.00	2578.39	2581.07	2581.07	2582.21	0.017926	8.58	110.98	50.82	1.00
Profile baseline	0	947.00	2572.39	2575.87	2575.87	2577.05	0.017992	8.73	108.53	46.37	1.00

EXISTING

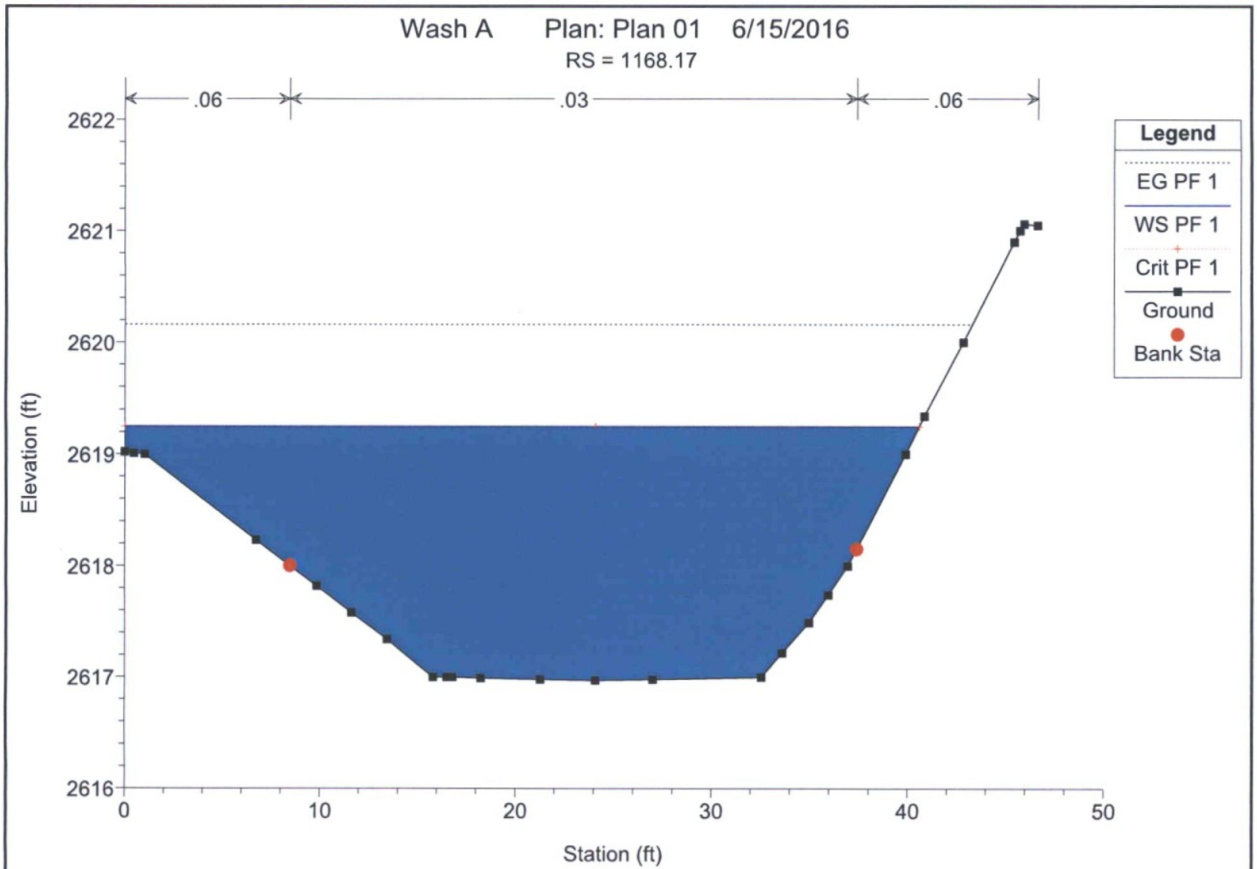
WASH A

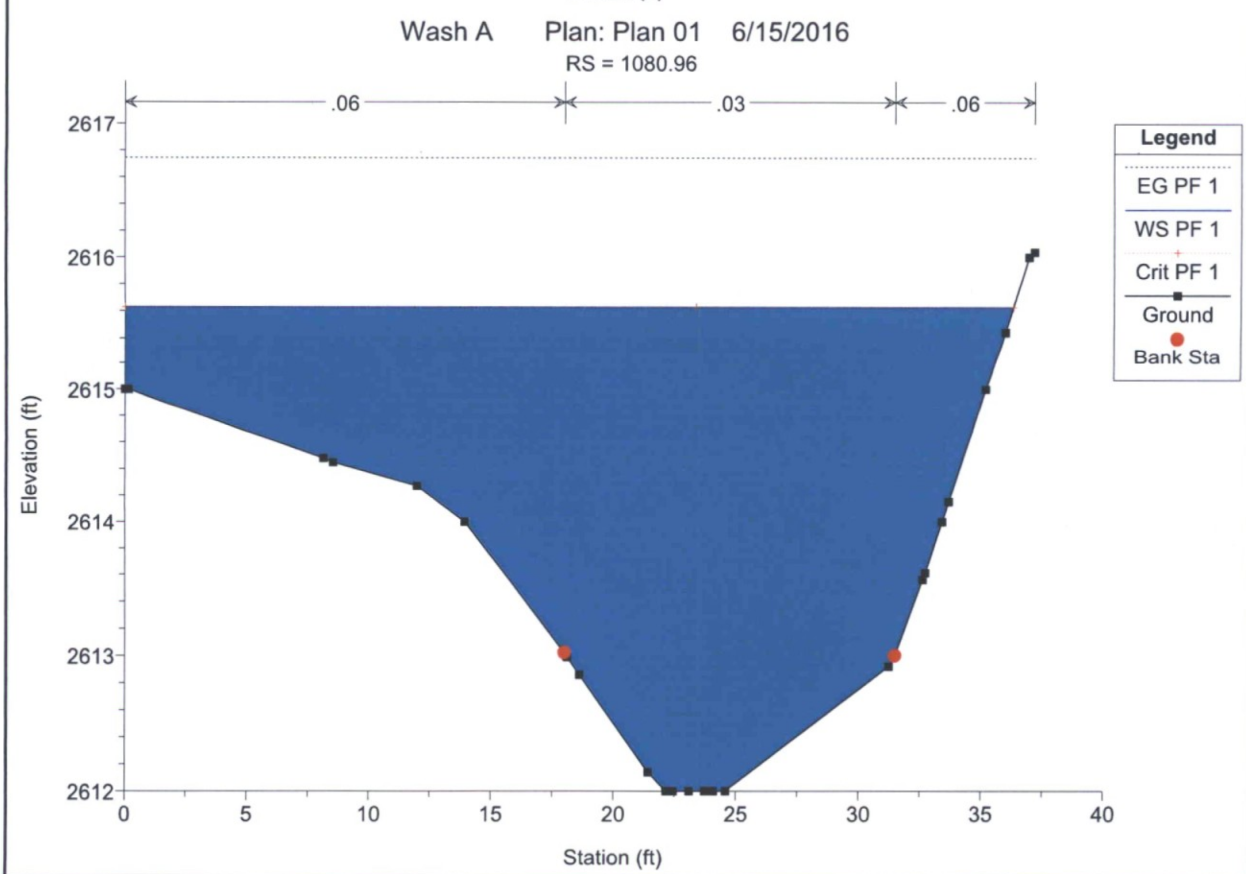


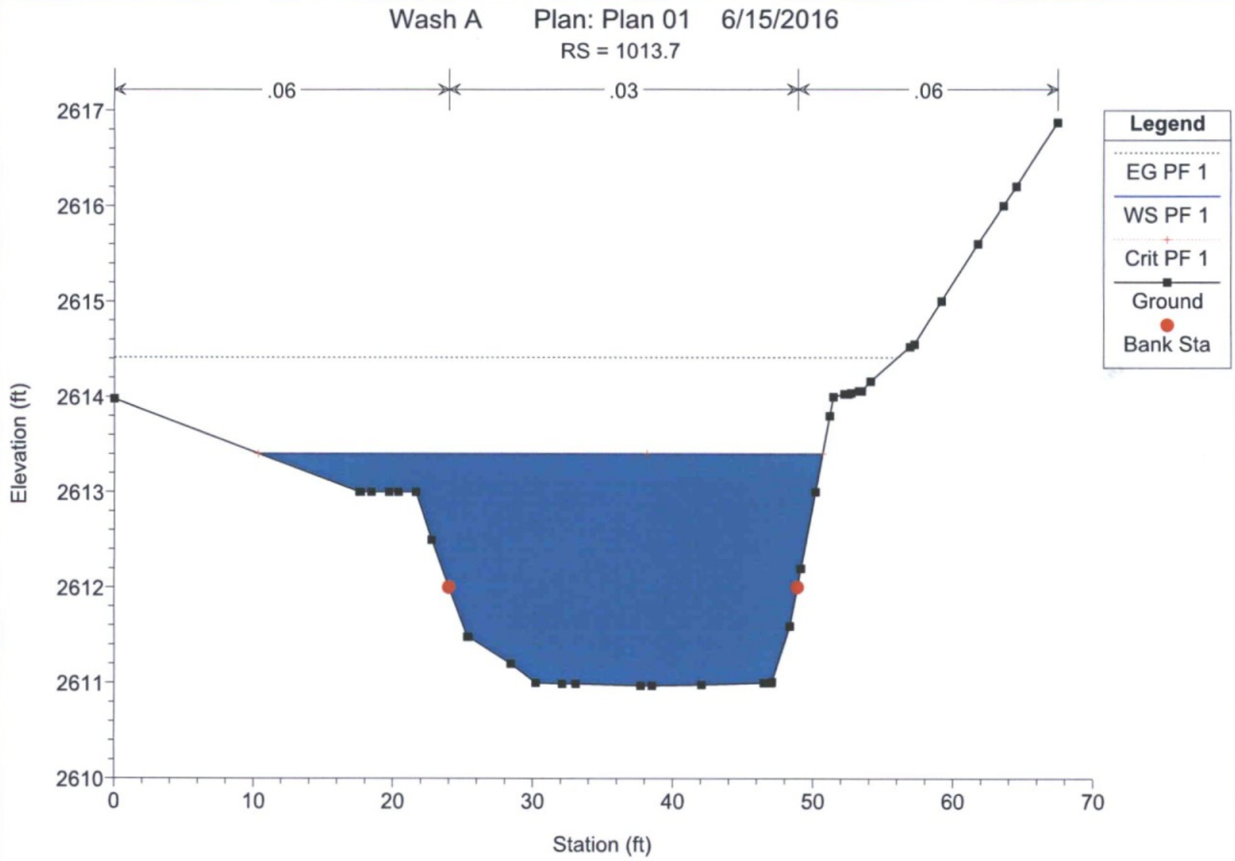
Wash A Plan: Plan 01 6/15/2016
NorthWash Alignment - Nort
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
2590
2595
2600
2605
2610
2615
2620
2625
250.44
357.67
441.04
535.5
598.95
664.75
713.67
756.56
778.43
826.23
875.49
943.36
1013.7
1080.96
1168.17
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

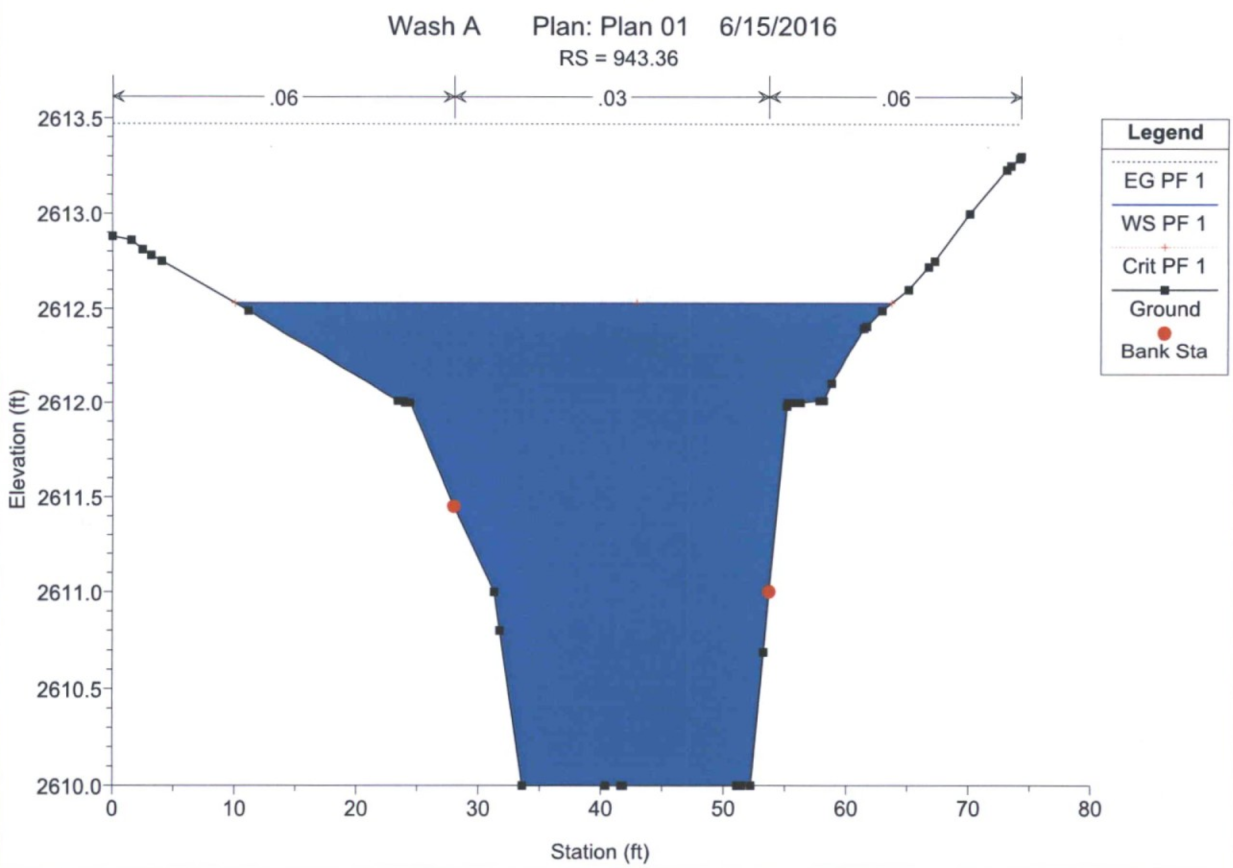


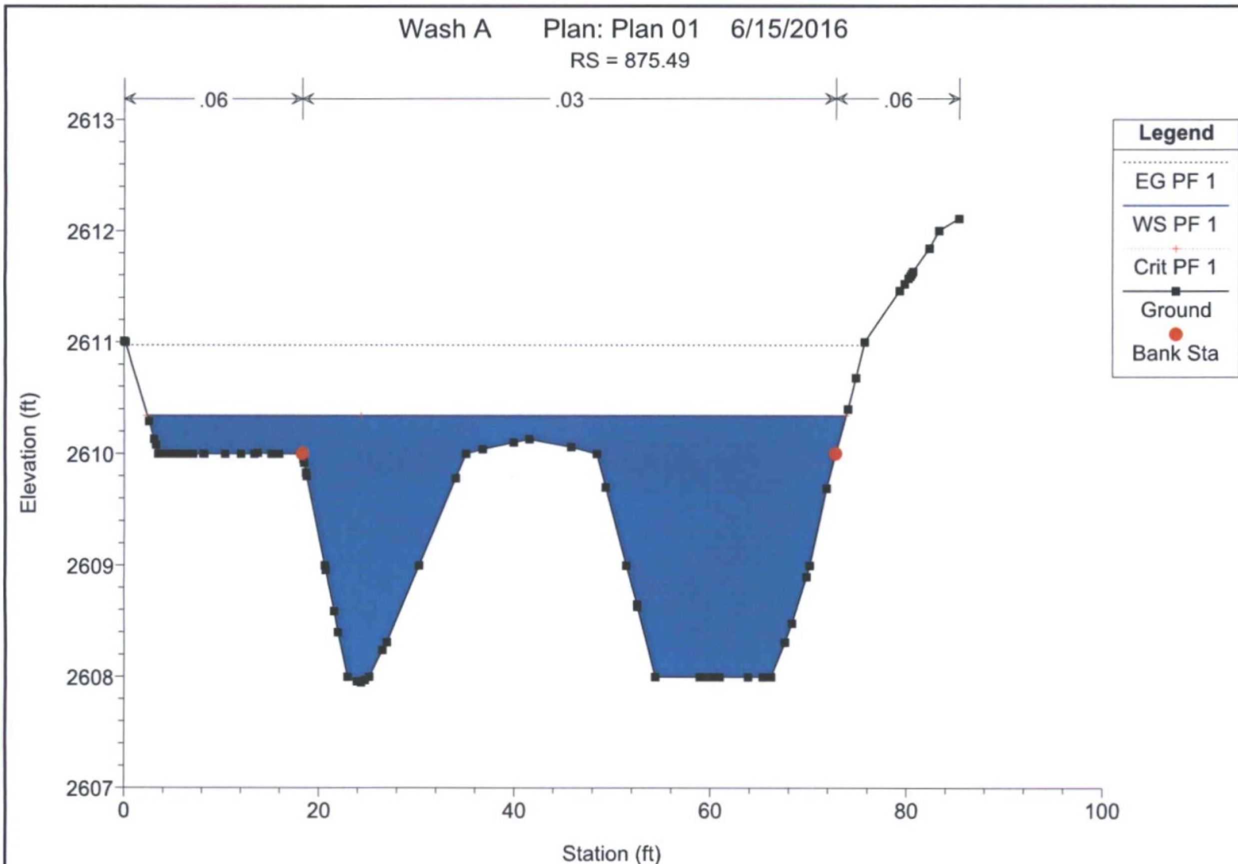
Alignment - Nort
North Wash
100.1
250.44
357.67
441.04
535.5
598.95
664.75
713.67
756.56
826.23
875.49
943.36
1080.96
1168.17

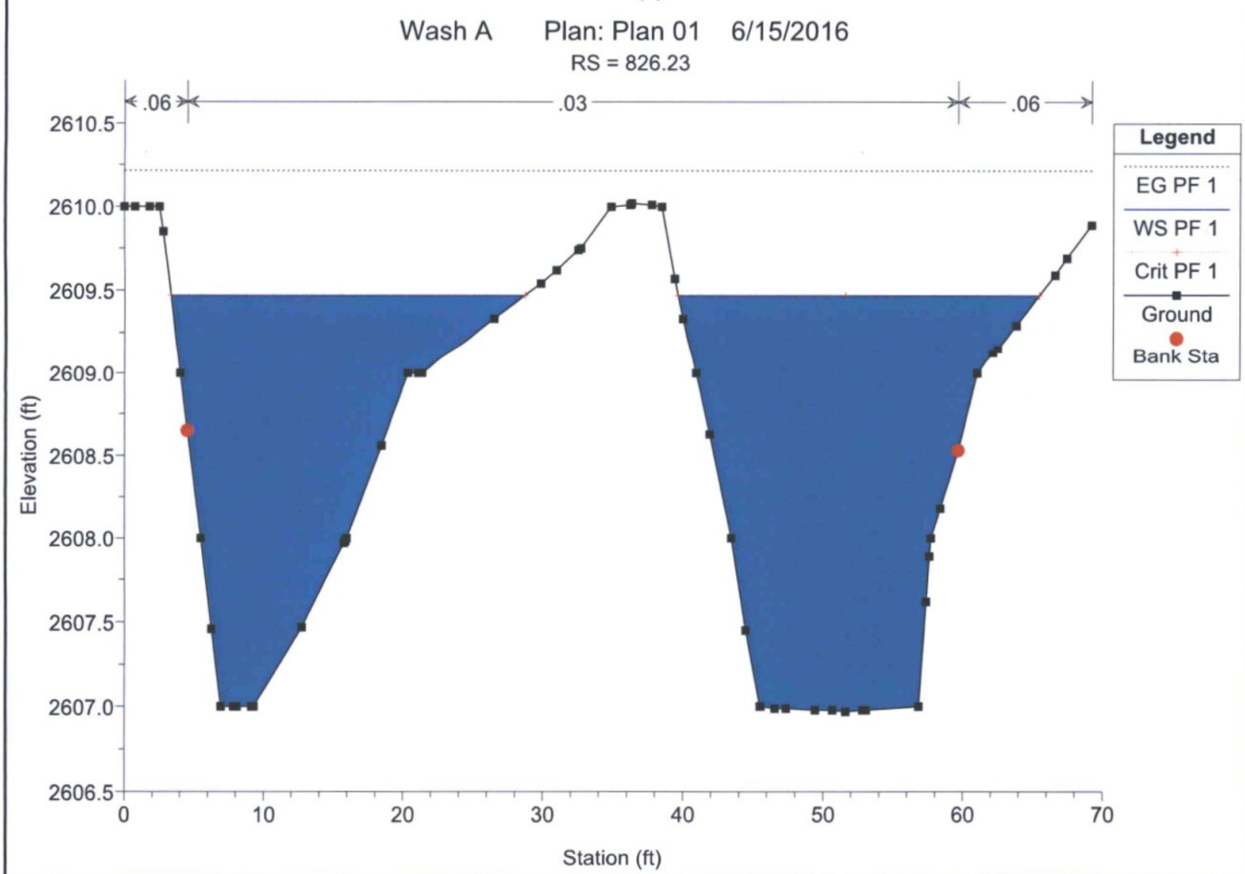

Wash A Plan: Plan 01 6/15/2016
RS = 1168.17
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
2622
2621
2620
2619
2618
2617
2616
Elevation (ft)
0
10
20
30
40
50
Station (ft)

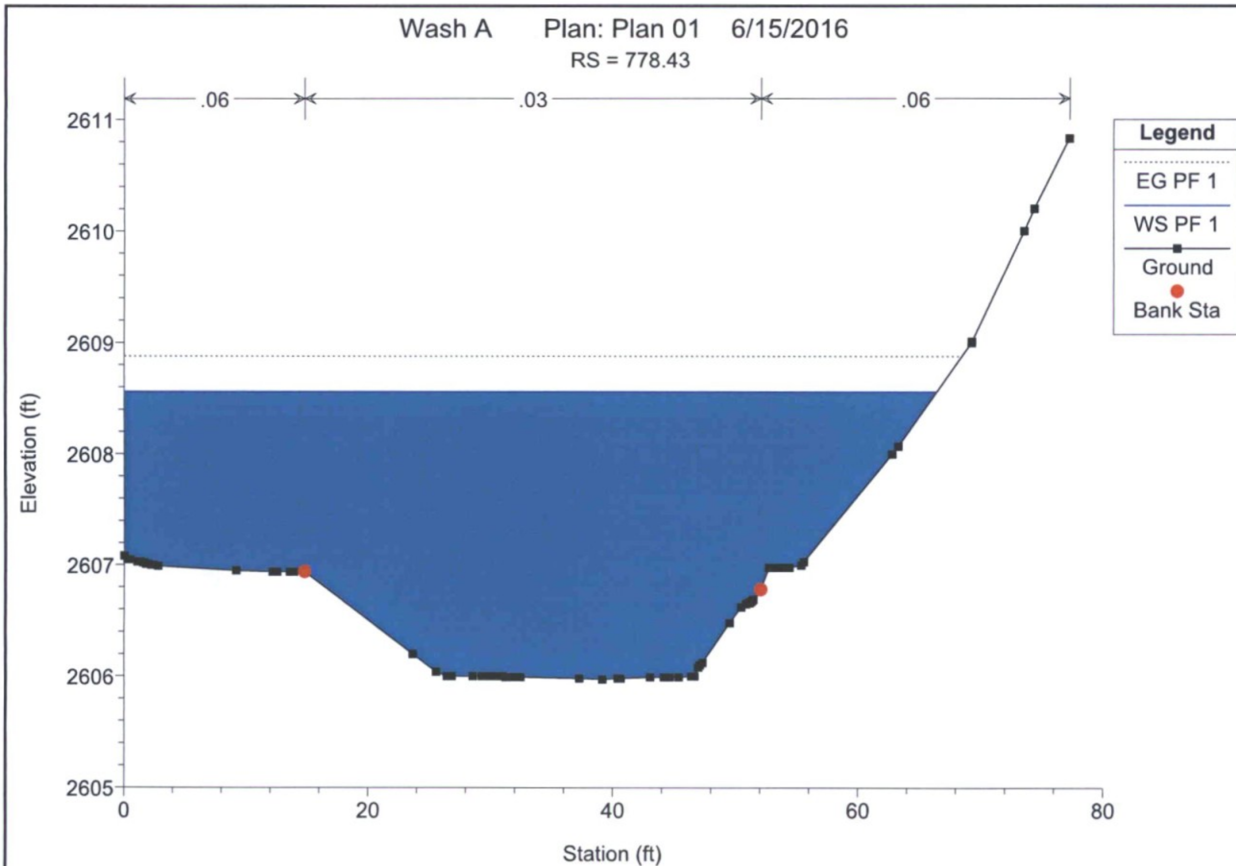

Wash A Plan: Plan 01 6/15/2016
RS = 1080.96
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
2617
2616
2615
2614
2613
2612
Elevation (ft)
0
5
10
15
20
25
30
35
40
Station (ft)

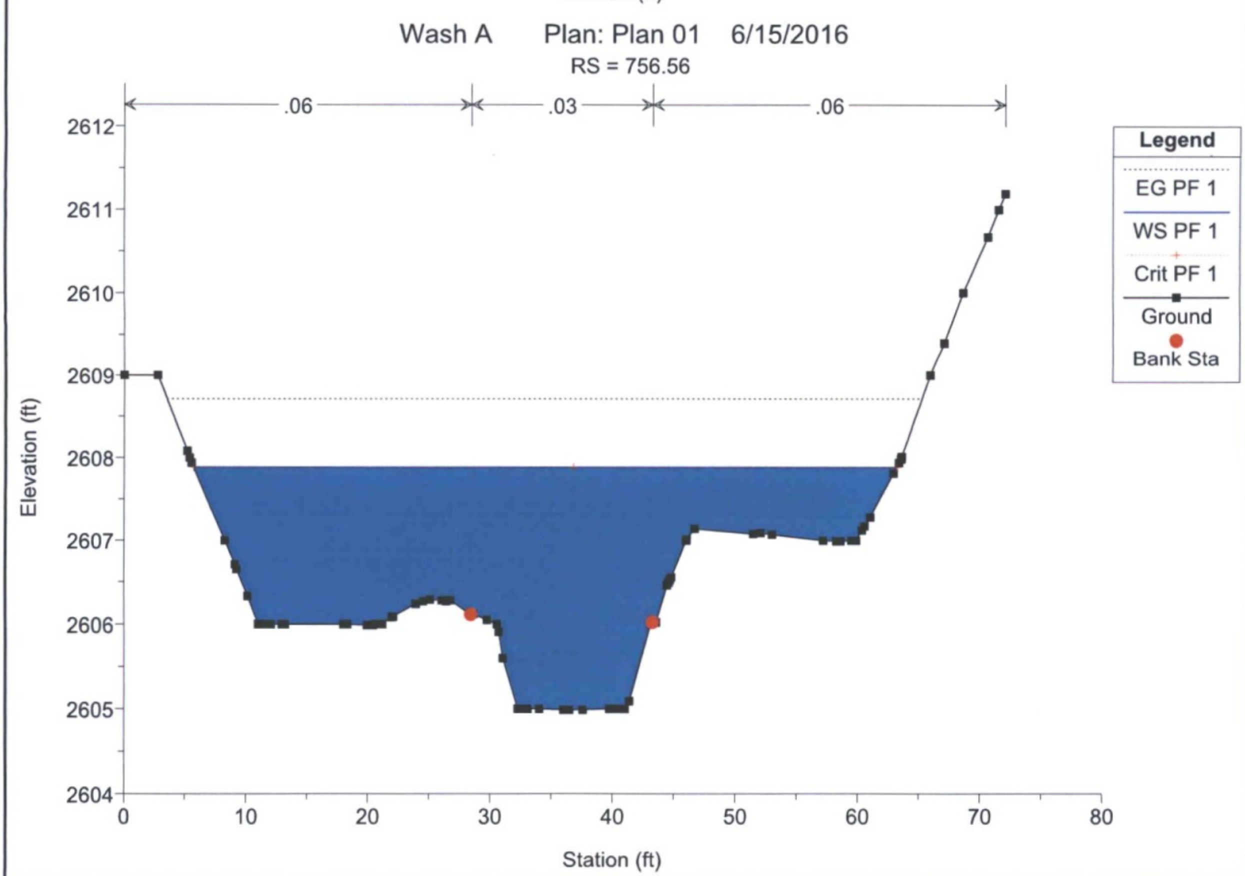

Wash A Plan: Plan 01 6/15/2016
RS = 1013.7
.06
.03
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

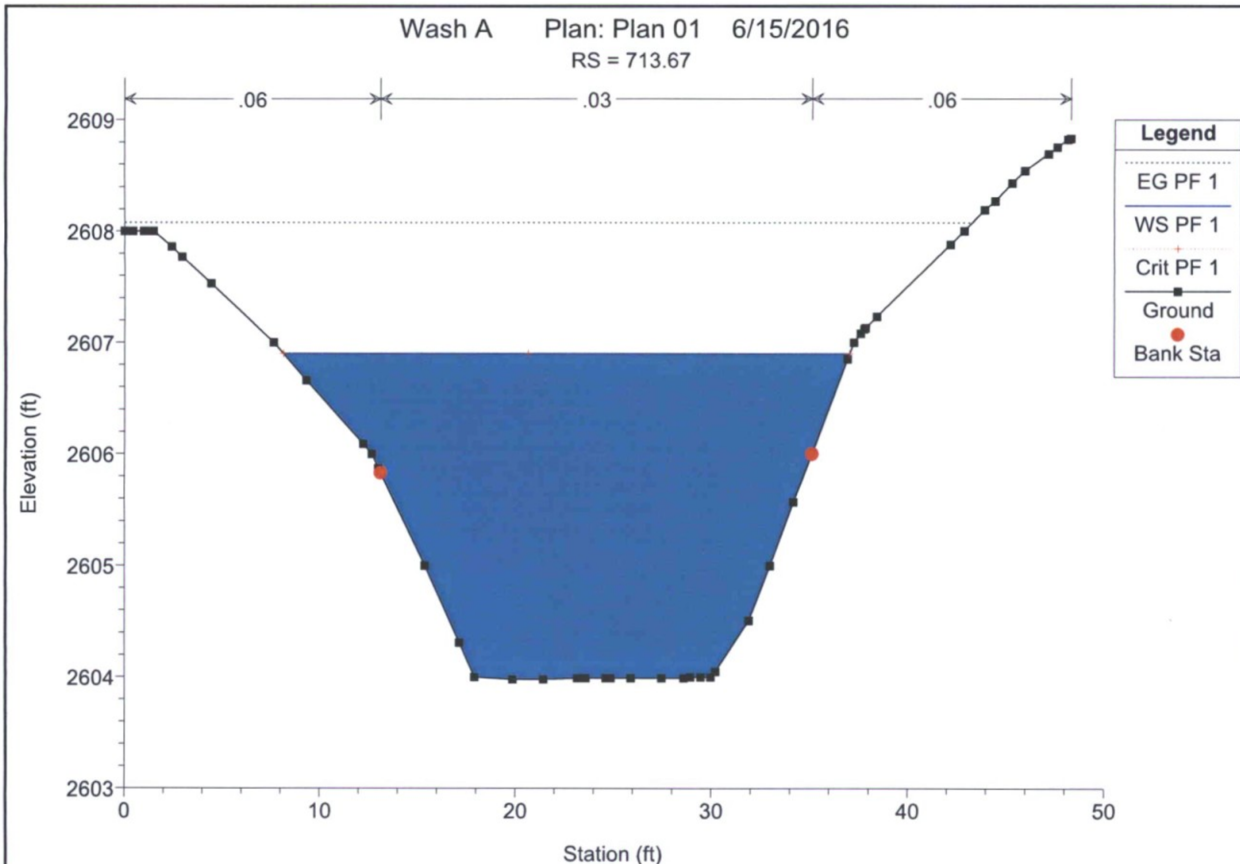

Wash A Plan: Plan 01 6/15/2016
RS = 943.36
.06
.03
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

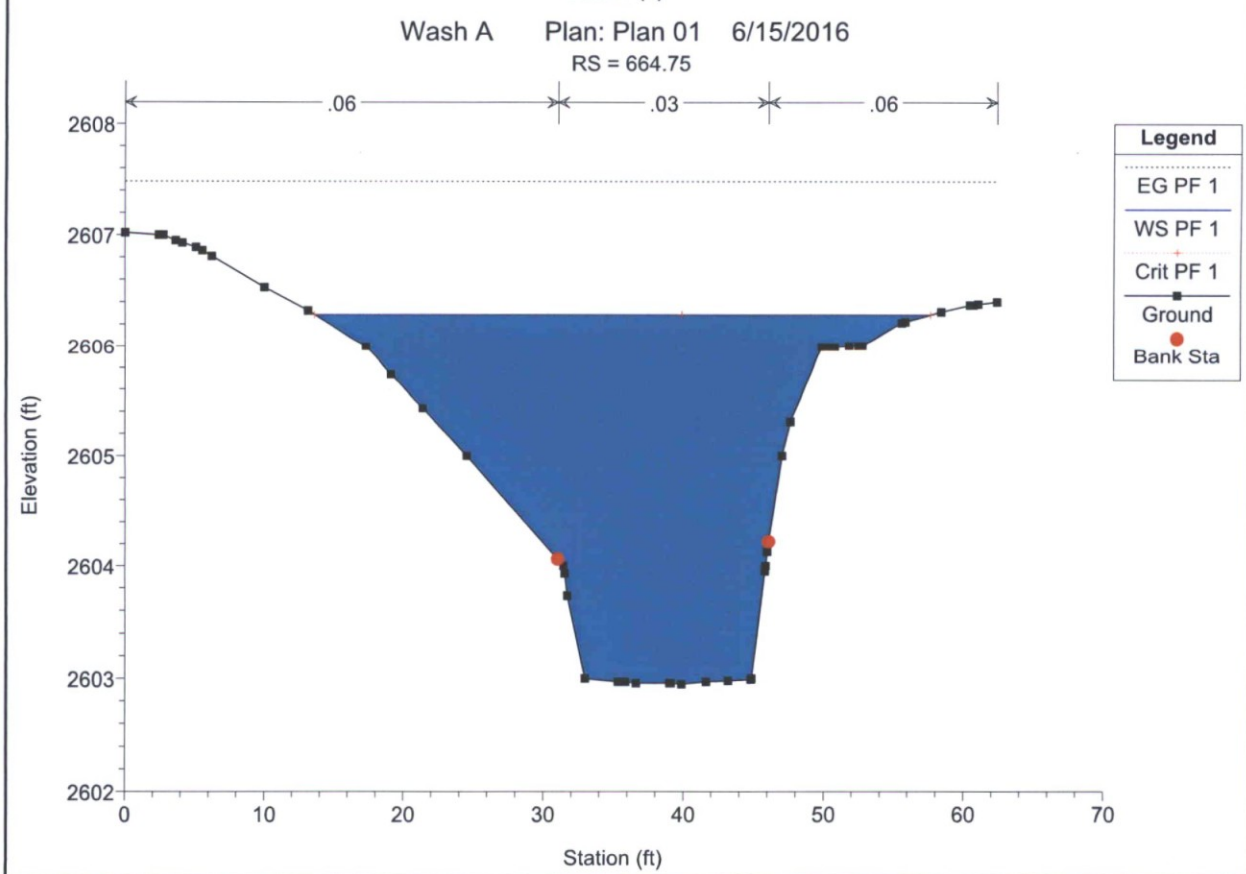

Wash A Plan: Plan 01 6/15/2016
RS = 875.49
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2613
2612
2611
2610
2609
2608
2607
0
20
40
60
80
100
Station (ft)

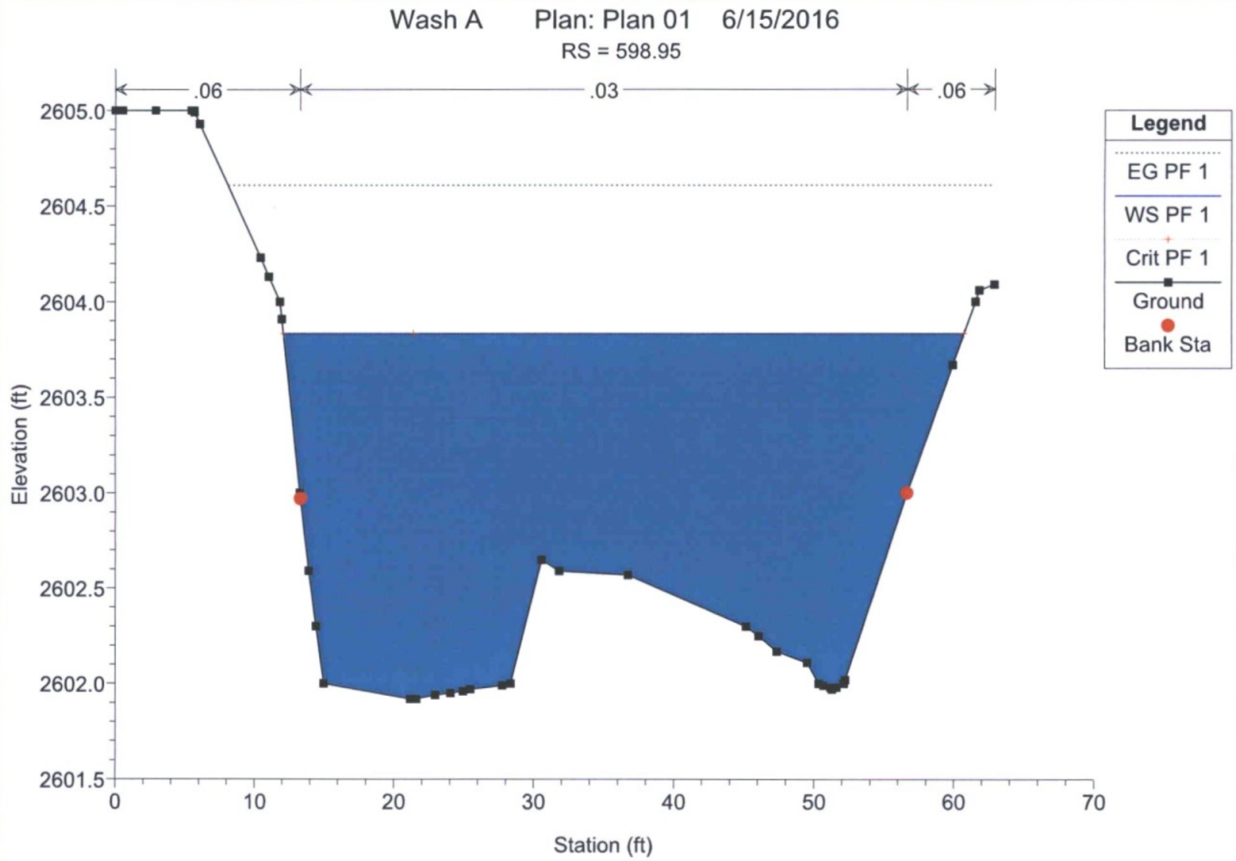

Wash A Plan: Plan 01 6/15/2016
RS = 826.23
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2610.5
2610.0
2609.5
2609.0
2608.5
2608.0
2607.5
2607.0
2606.5
0
10
20
30
40
50
60
70
Station (ft)


Wash A Plan: Plan 01 6/15/2016
RS = 778.43
.06
.03
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2611
2610
2609
2608
2607
2606
2605
0
20
40
60
80
Station (ft)

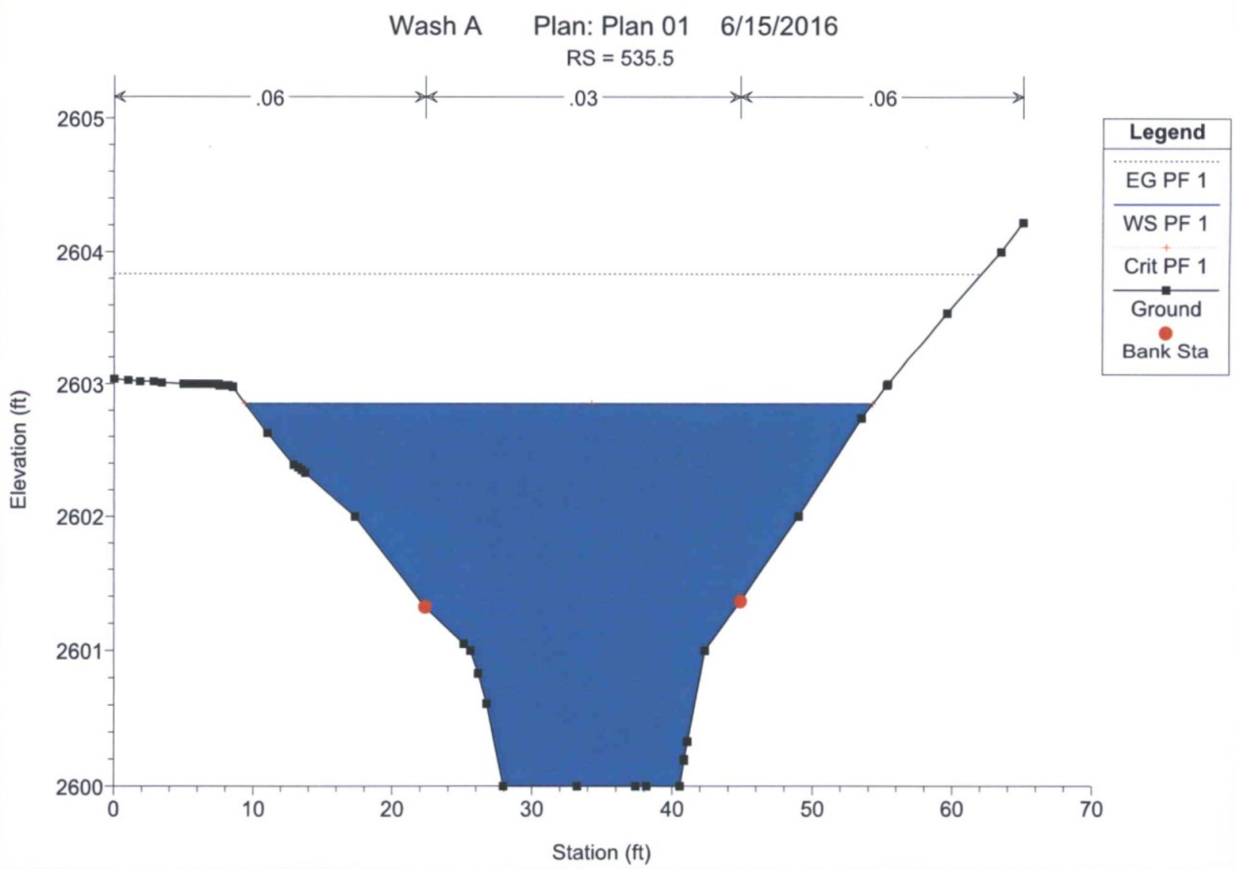

Wash A Plan: Plan 01 6/15/2016
RS = 756.56
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2612
2611
2610
2609
2608
2607
2606
2605
2604
0
10
20
30
40
50
60
70
80
Station (ft)


Wash A Plan: Plan 01 6/15/2016
RS = 713.67
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

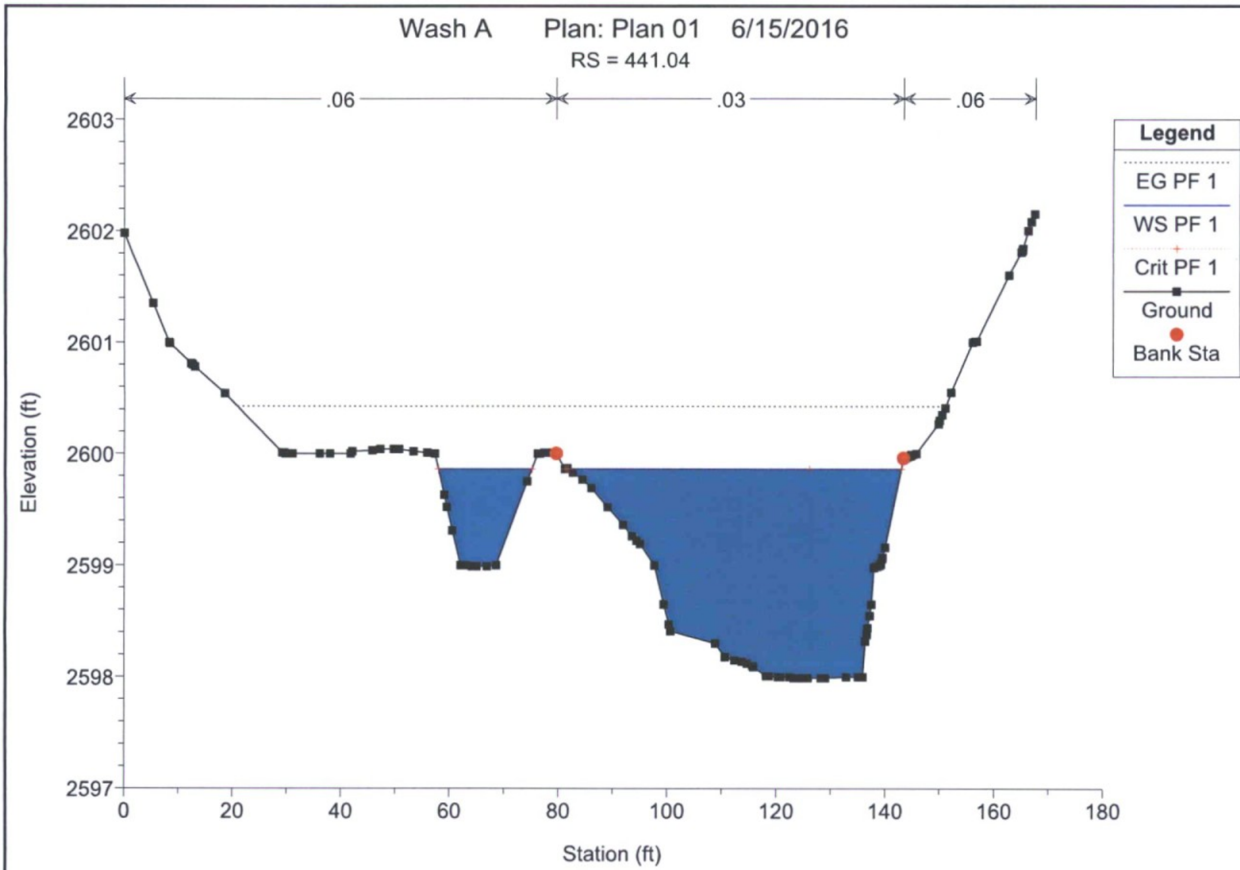

Wash A Plan: Plan 01 6/15/2016
RS = 664.75
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)



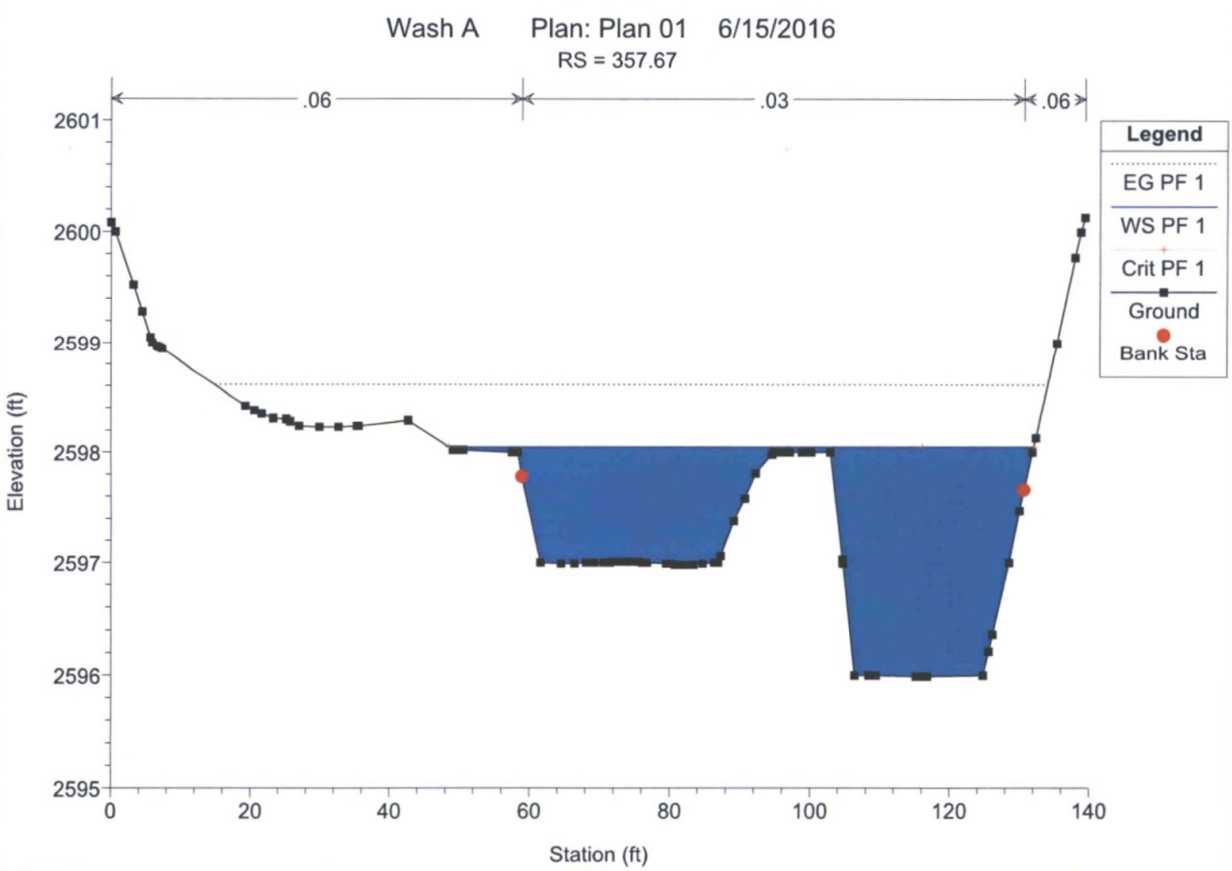
Wash A Plan: Plan 01 6/15/2016
RS = 598.95
.06
.03
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta



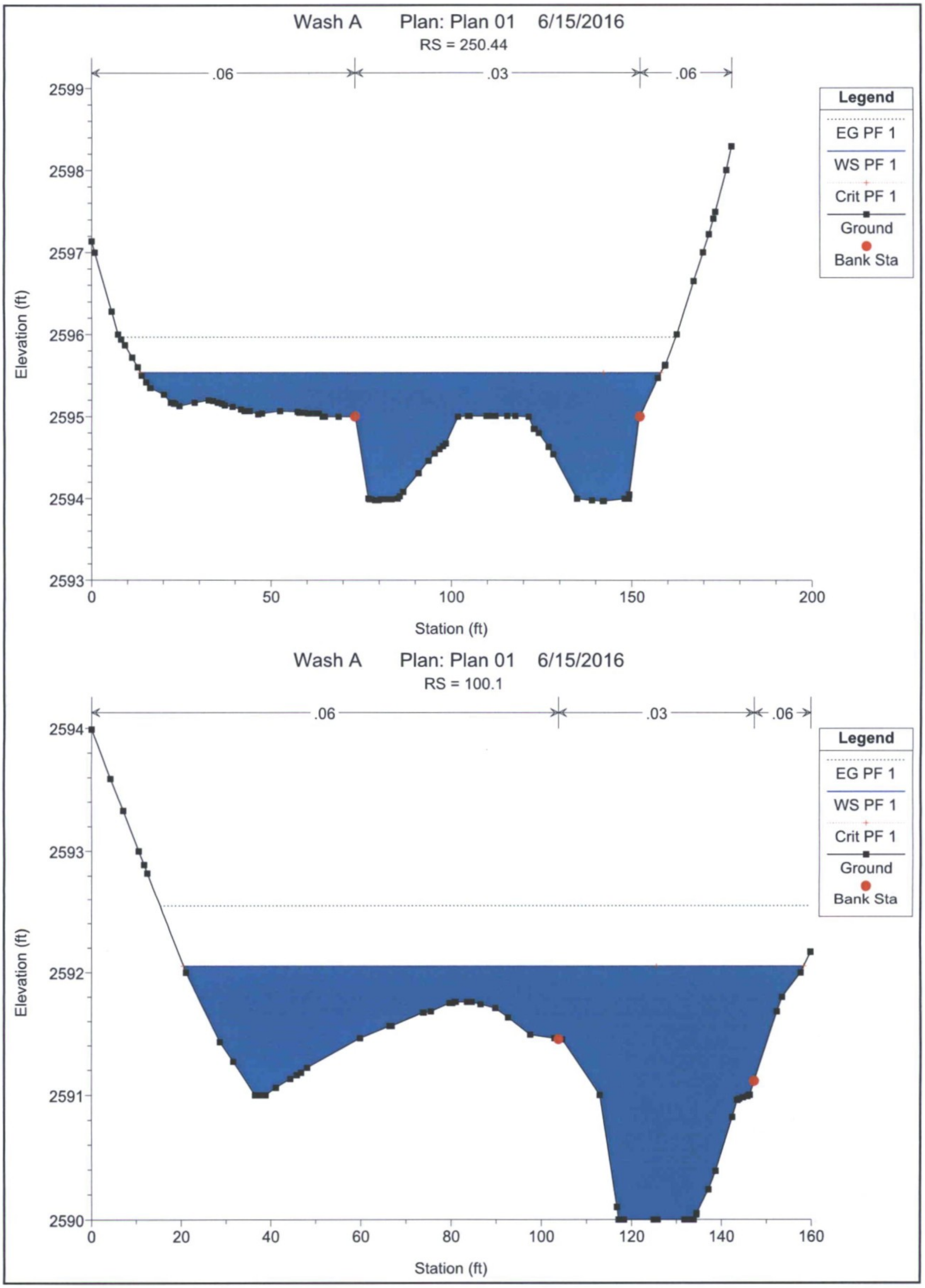
Wash A Plan: Plan 01 6/15/2016
RS = 535.5
.06
.03
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta



Wash A Plan: Plan 01 6/15/2016
RS = 441.04
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2603
2602
2601
2600
2599
2598
2597
0
20
40
60
80
100
120
140
160
180
Station (ft)



Wash A Plan: Plan 01 6/15/2016
RS = 357.67
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2601
2600
2599
2598
2597
2596
2595
0
20
40
60
80
100
120
140
Station (ft)

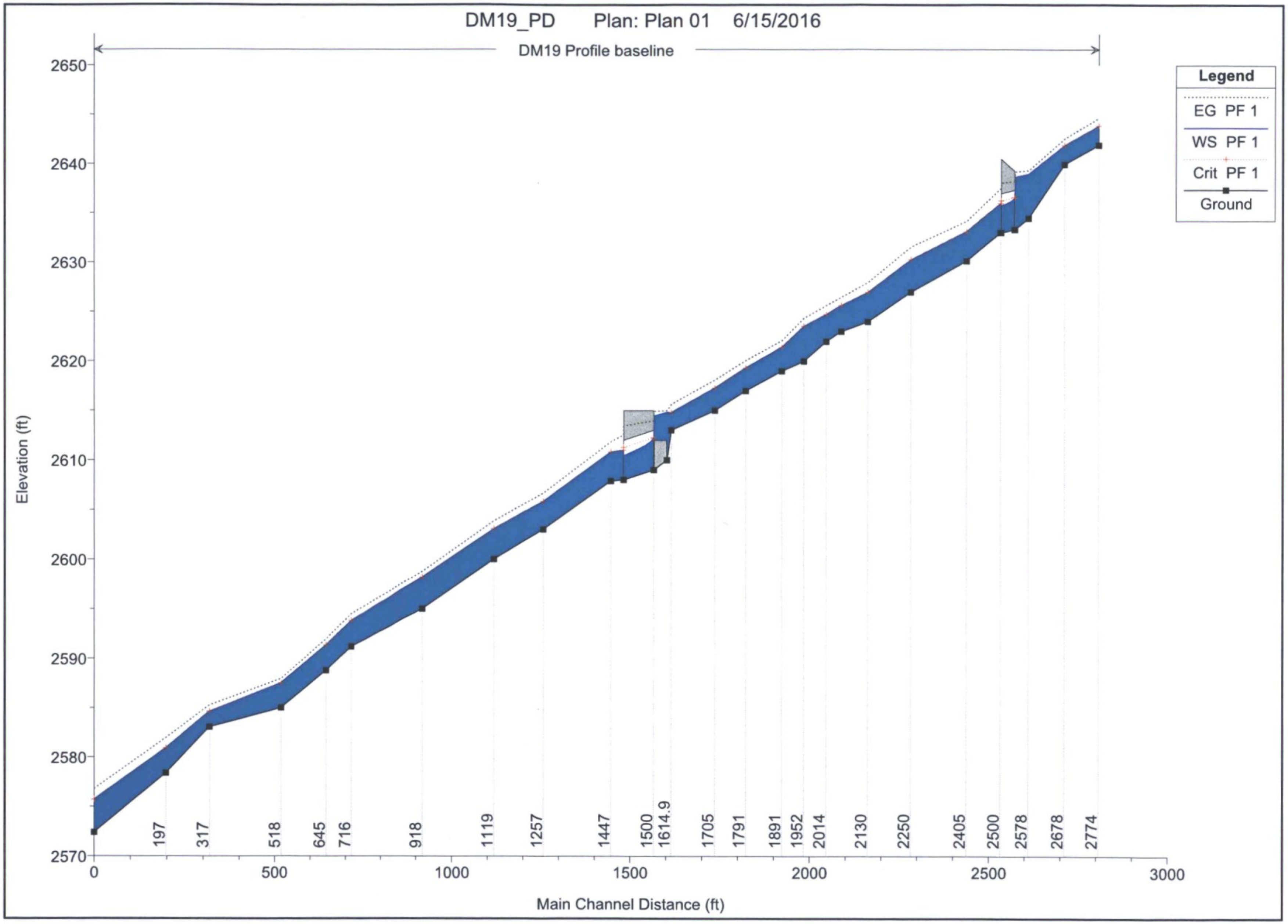

Wash A Plan: Plan 01 6/15/2016
RS = 250.44
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2599
2598
2597
2596
2595
2594
2593
0
50
100
150
200
Station (ft)
Wash A Plan: Plan 01 6/15/2016
RS = 100.1
.06
.03
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2594
2593
2592
2591
2590
0
20
40
60
80
100
120
140
160
Station (ft)

HEC-RAS Plan: Plan 01 River: NorthWash Reach: Alignment - Nort Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alignment - Nort	1168.17	472.00	2616.97	2619.25	2619.25	2620.16	0.009615	7.77	66.58	40.60	0.96
Alignment - Nort	1080.96	472.00	2612.00	2615.63	2615.63	2616.74	0.007289	9.15	73.61	36.33	0.90
Alignment - Nort	1013.7	472.00	2610.97	2613.40	2613.40	2614.41	0.009090	8.13	63.57	40.35	0.95
Alignment - Nort	943.36	480.00	2610.00	2612.53	2612.53	2613.47	0.008585	7.89	70.29	53.67	0.92
Alignment - Nort	875.49	480.00	2607.95	2610.34	2610.34	2610.97	0.011524	6.41	79.21	71.47	0.97
Alignment - Nort	826.23	480.00	2606.97	2609.47	2609.47	2610.22	0.011584	6.96	71.02	51.19	0.98
Alignment - Nort	778.43	480.00	2605.97	2608.56		2608.88	0.002981	4.79	125.60	66.45	0.55
Alignment - Nort	756.56	480.00	2604.99	2607.89	2607.89	2608.72	0.008770	8.59	91.77	57.49	0.94
Alignment - Nort	713.67	485.00	2603.98	2606.90	2606.90	2608.08	0.009615	8.74	58.25	28.88	0.98
Alignment - Nort	664.75	485.00	2602.95	2606.28	2606.28	2607.48	0.007889	9.19	70.56	44.05	0.91
Alignment - Nort	598.95	485.00	2601.92	2603.83	2603.83	2604.61	0.011333	7.08	70.34	48.65	0.99
Alignment - Nort	535.5	485.00	2600.00	2602.85	2602.85	2603.84	0.008559	8.21	72.00	44.88	0.92
Alignment - Nort	441.04	490.00	2597.99	2599.86	2599.86	2600.43	0.011514	6.13	87.05	78.67	0.97
Alignment - Nort	357.67	490.00	2595.99	2598.05	2598.05	2598.61	0.012877	6.04	81.71	83.58	1.00
Alignment - Nort	250.44	495.00	2593.97	2595.54	2595.54	2595.97	0.011294	5.46	110.14	144.51	0.93
Alignment - Nort	100.1	495.00	2590.00	2592.05	2592.05	2592.55	0.008482	6.12	119.82	137.73	0.86

POST-DEVELOPMENT

GALLOWAY WASH



DM19_PD Plan: Plan 01 6/15/2016
DM19 Profile baseline
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
2570
2580
2590
2600
2610
2620
2630
2640
2650
Main Channel Distance (ft)
0
500
1000
1500
2000
2500
3000
197
317
518
645
716
918
1119
1257
1447
1500
1614.9
1705
1791
1891
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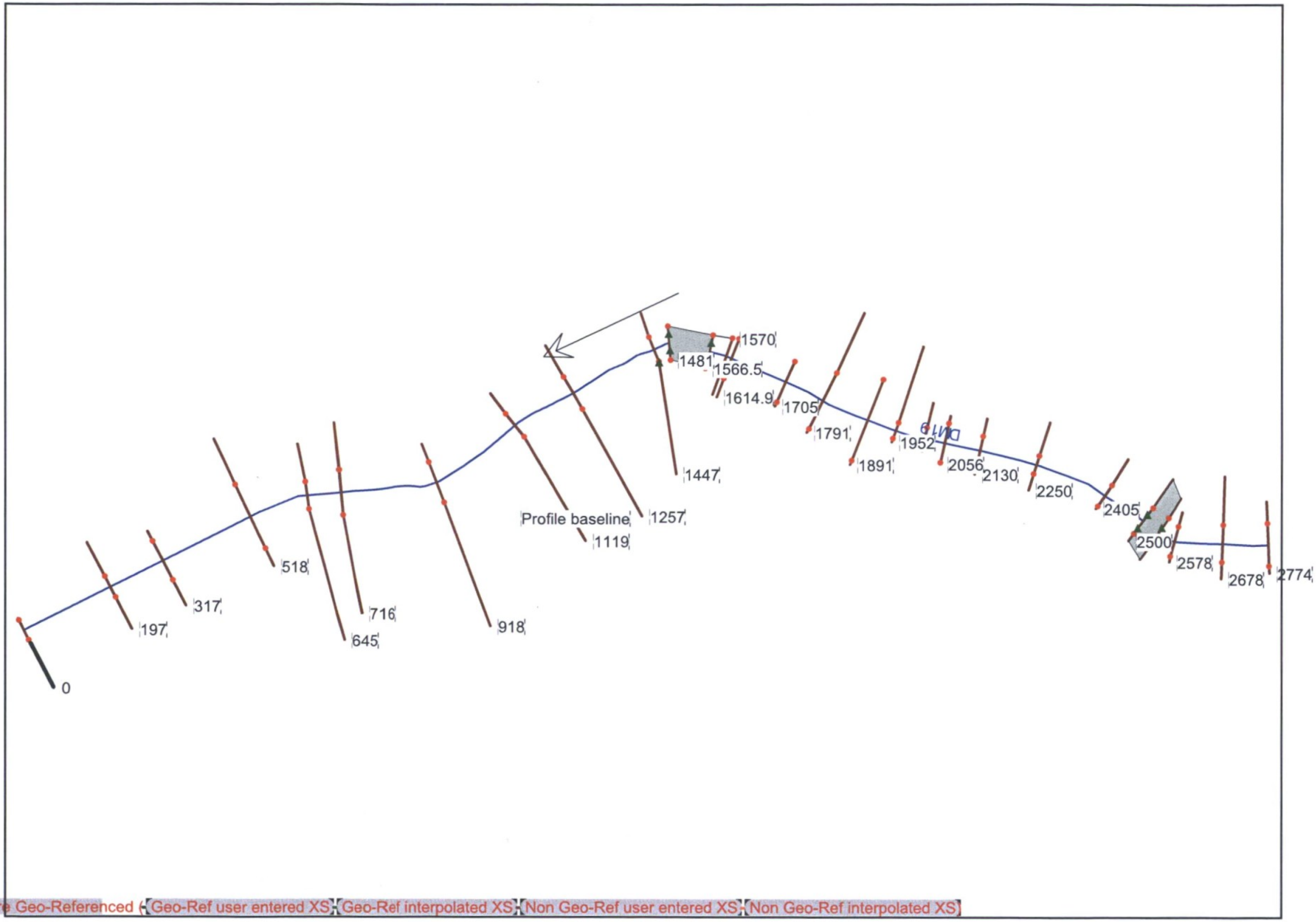
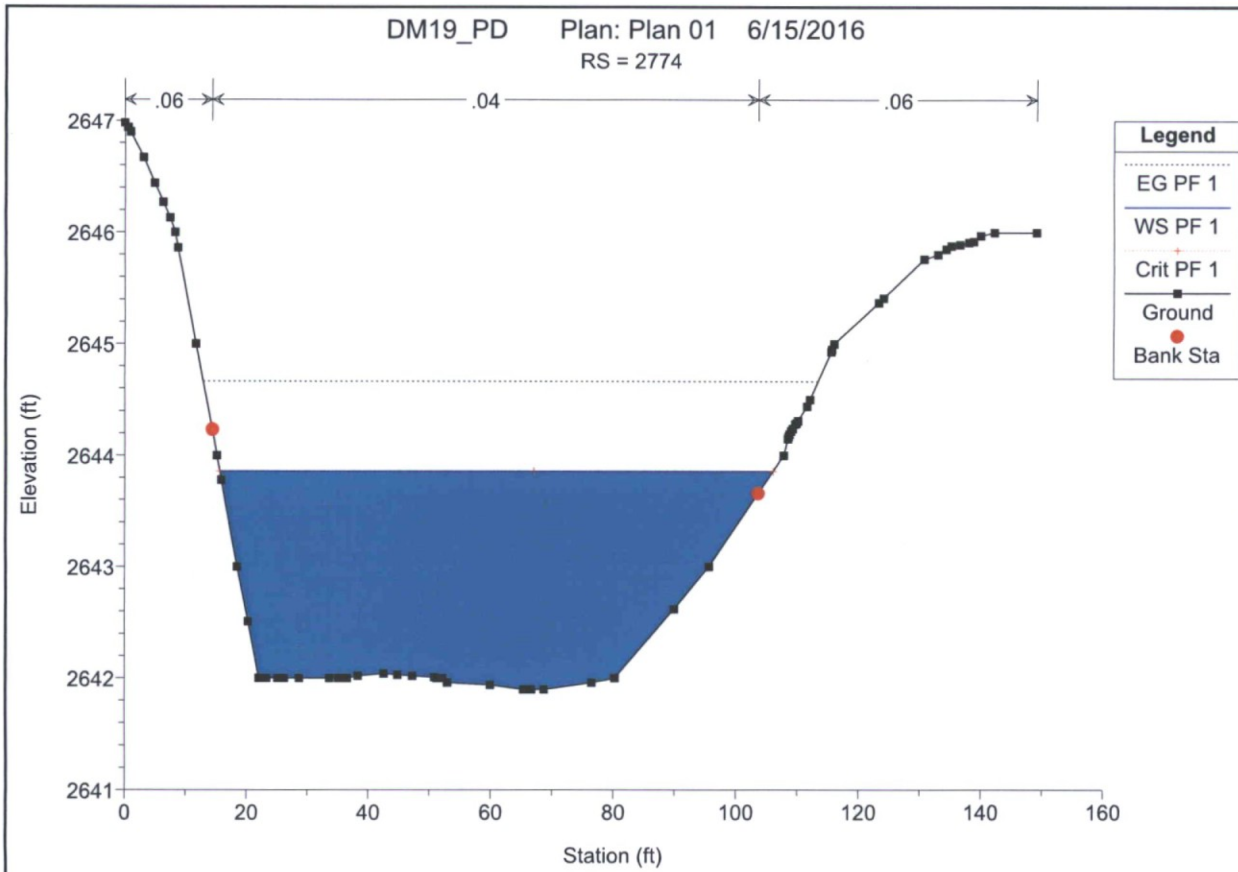
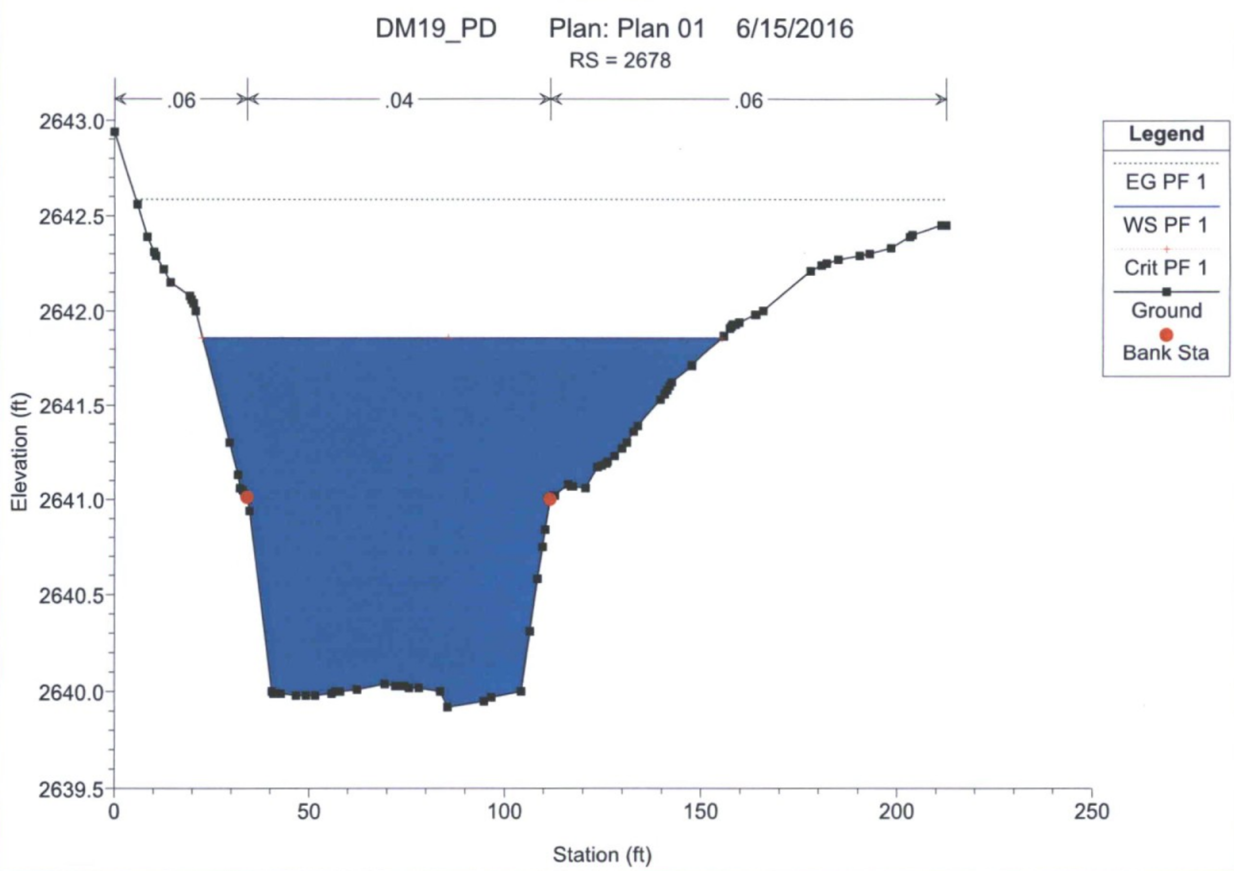
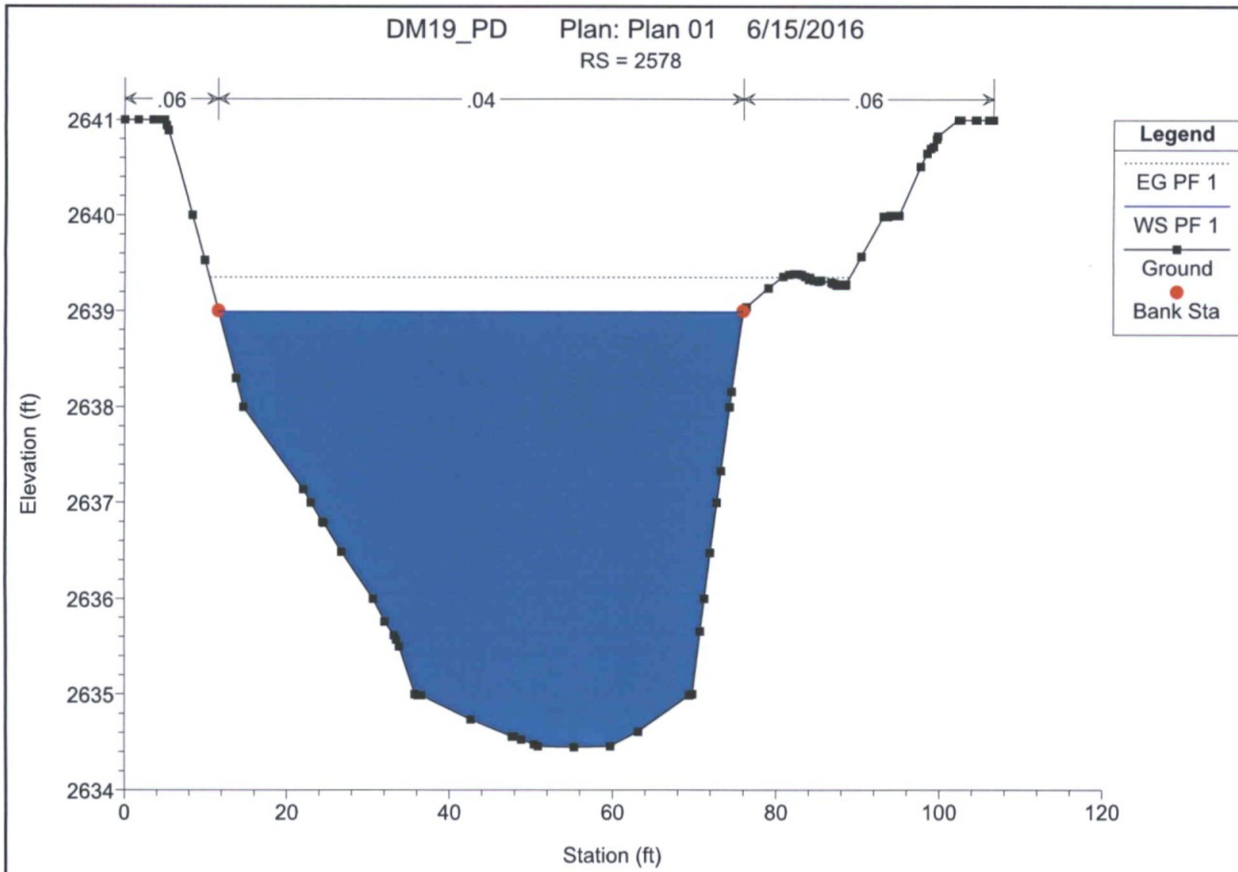
2250
2405
2500
2578
2678
2774

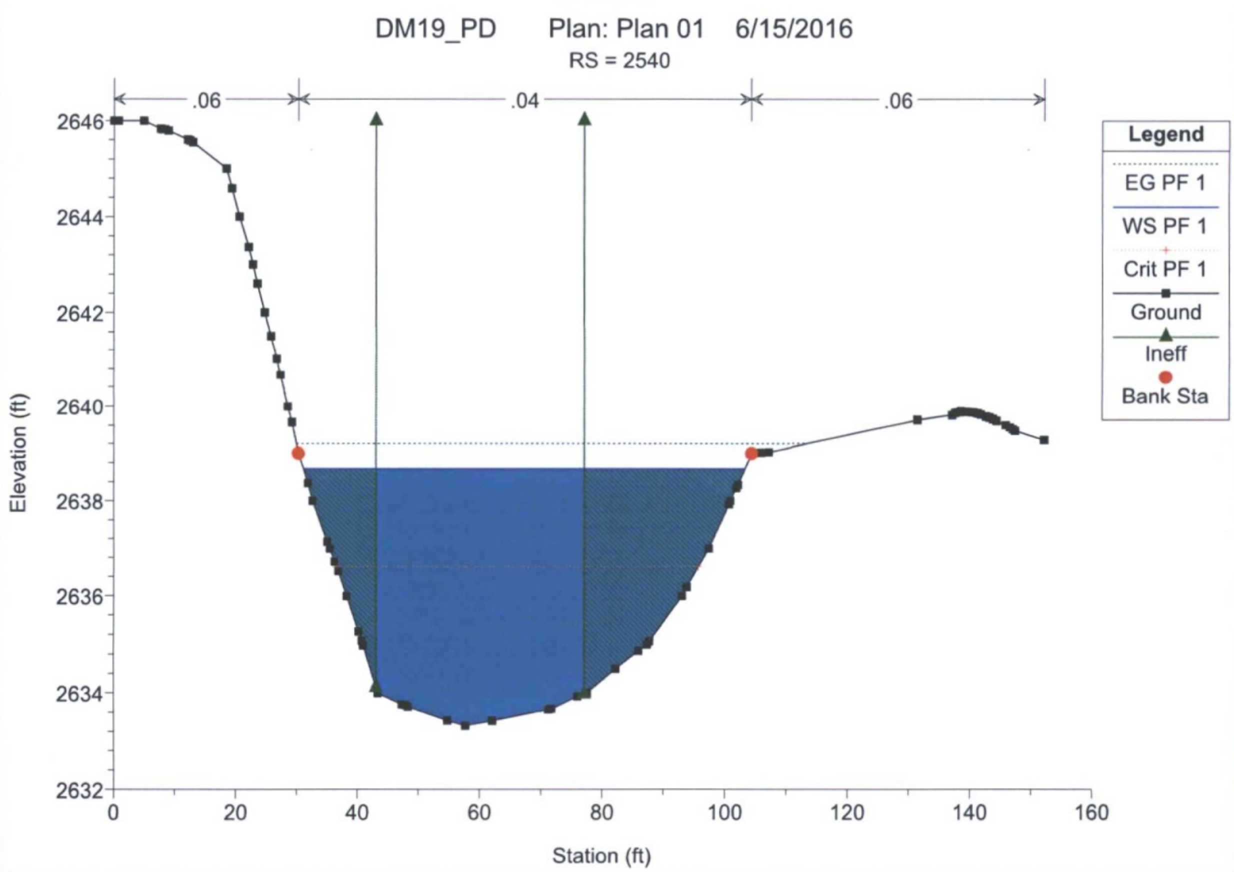


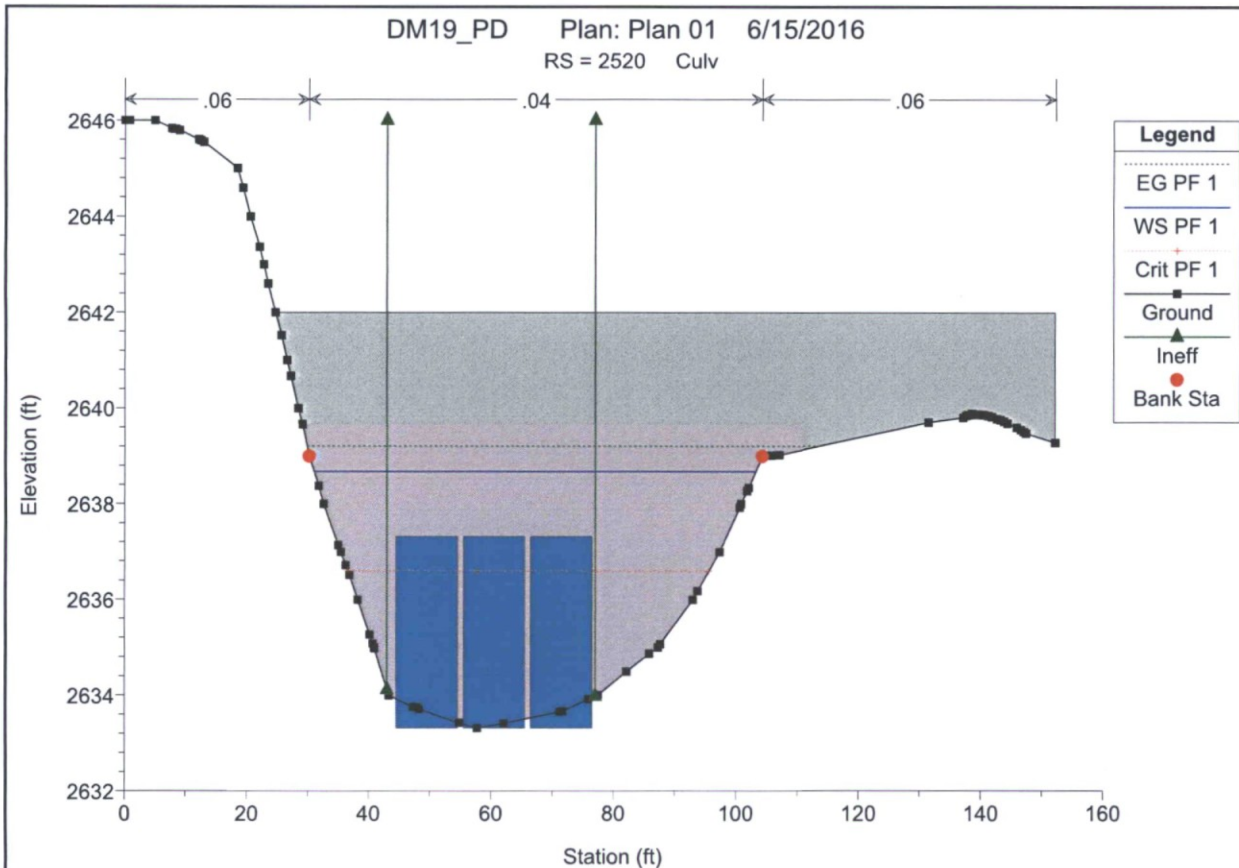
ne of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)

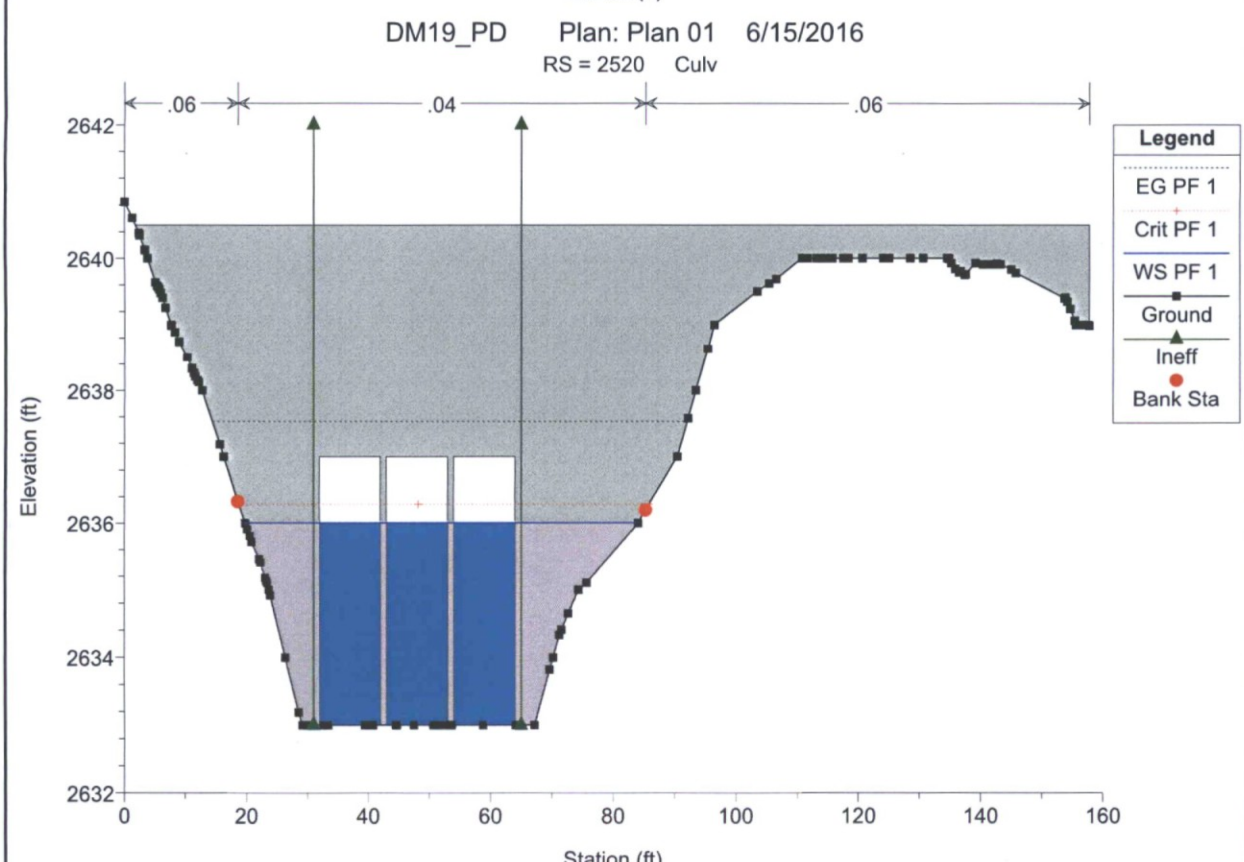

DM19_PD Plan: Plan 01 6/15/2016
RS = 2774
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

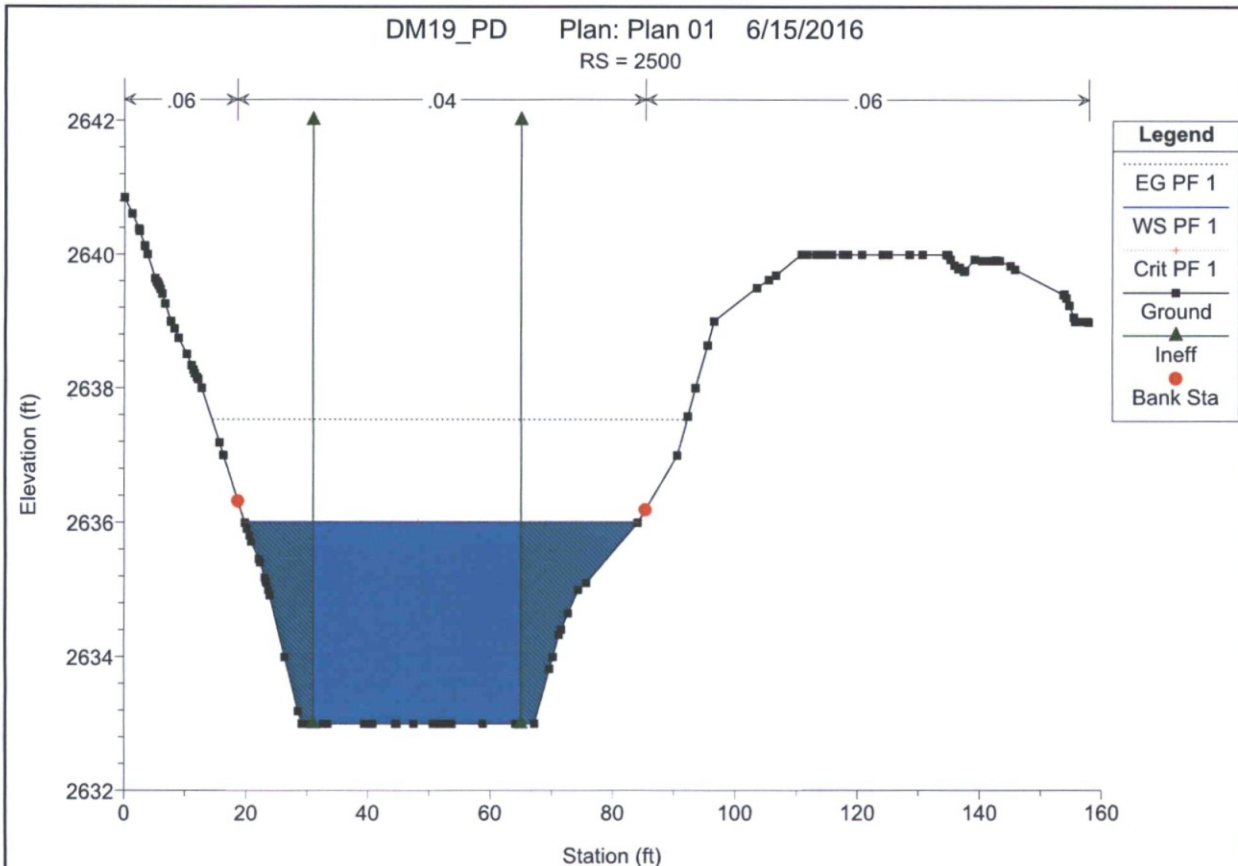

DM19_PD Plan: Plan 01 6/15/2016
RS = 2678
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

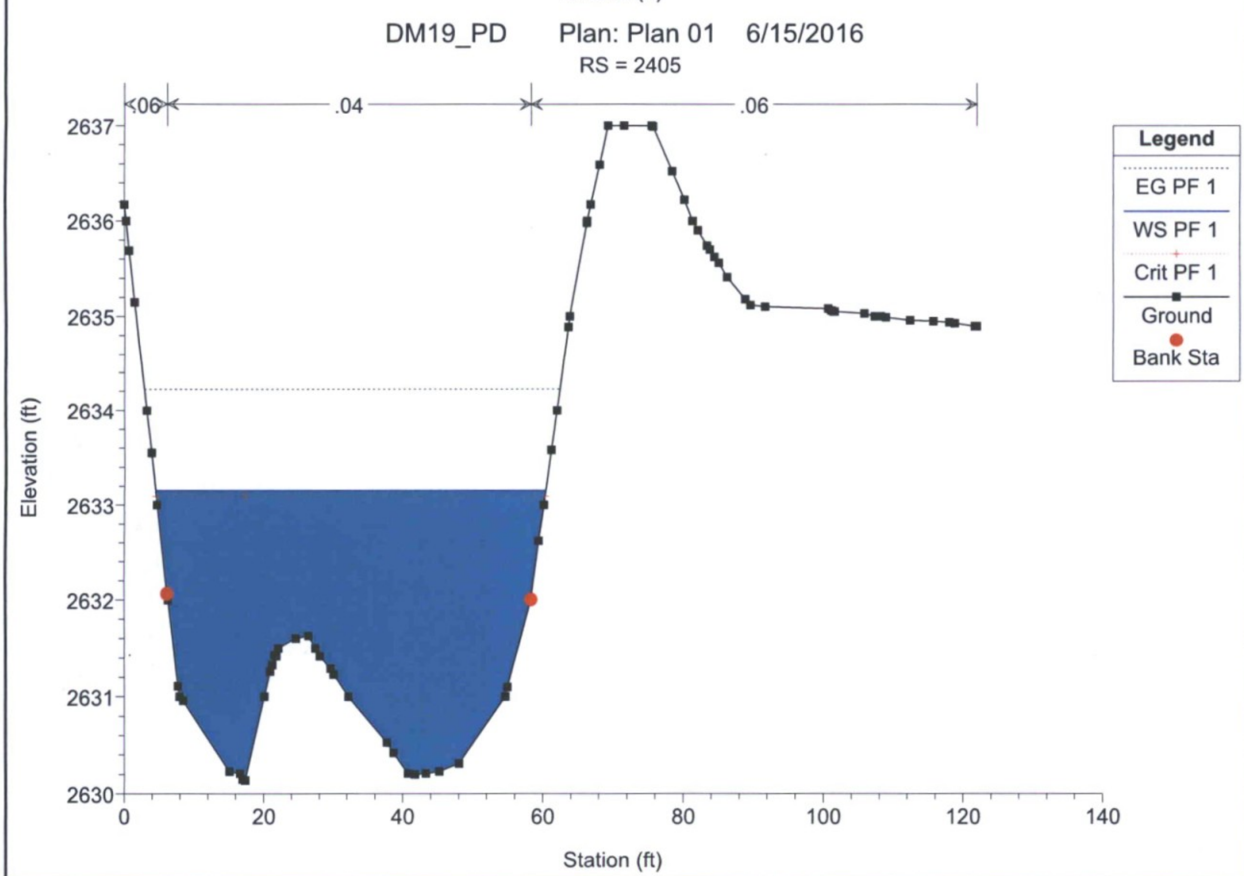

DM19_PD Plan: Plan 01 6/15/2016
RS = 2578
.06
.04
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

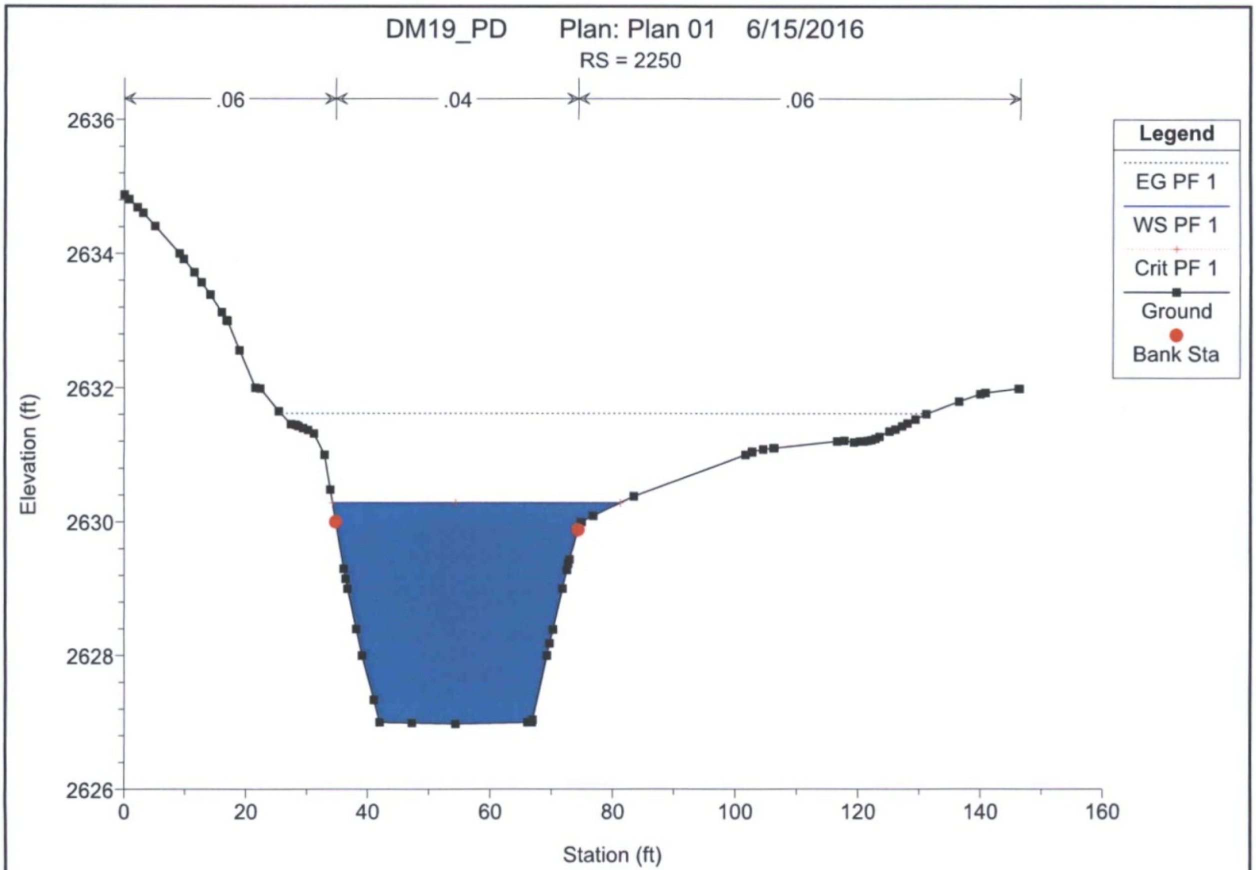

DM19_PD Plan: Plan 01 6/15/2016
RS = 2540
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

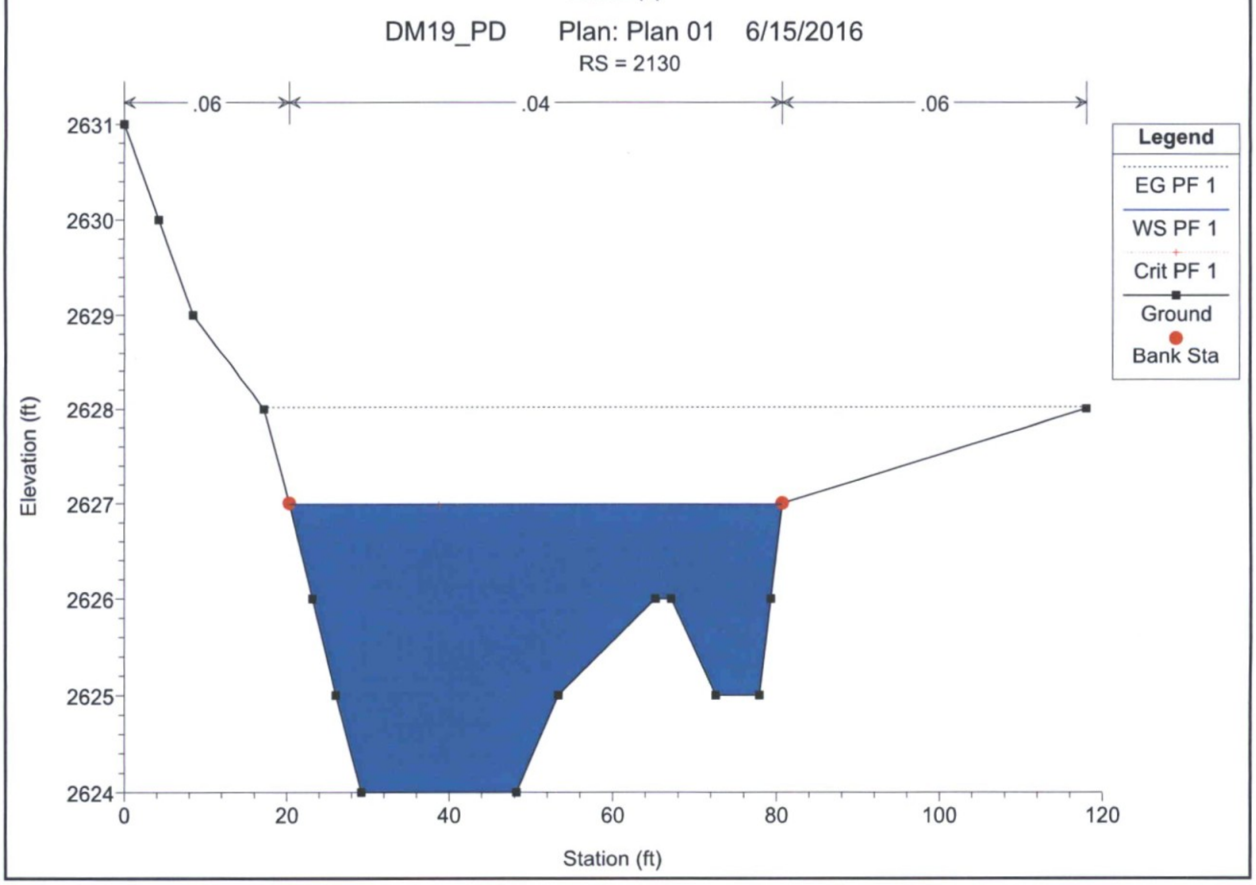

DM19_PD Plan: Plan 01 6/15/2016
RS = 2520 Culv
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

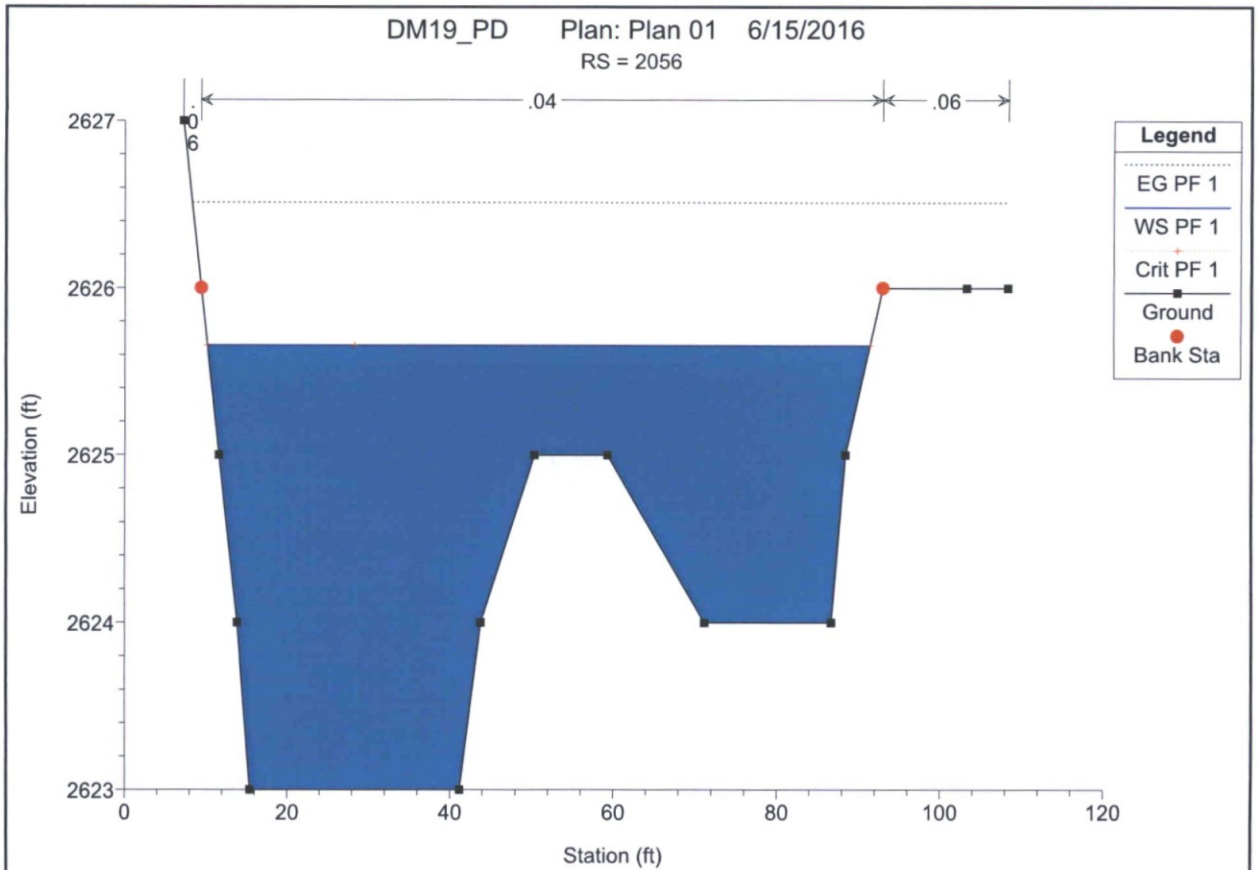

DM19_PD Plan: Plan 01 6/15/2016
RS = 2520 Culv
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Ineff
Bank Sta

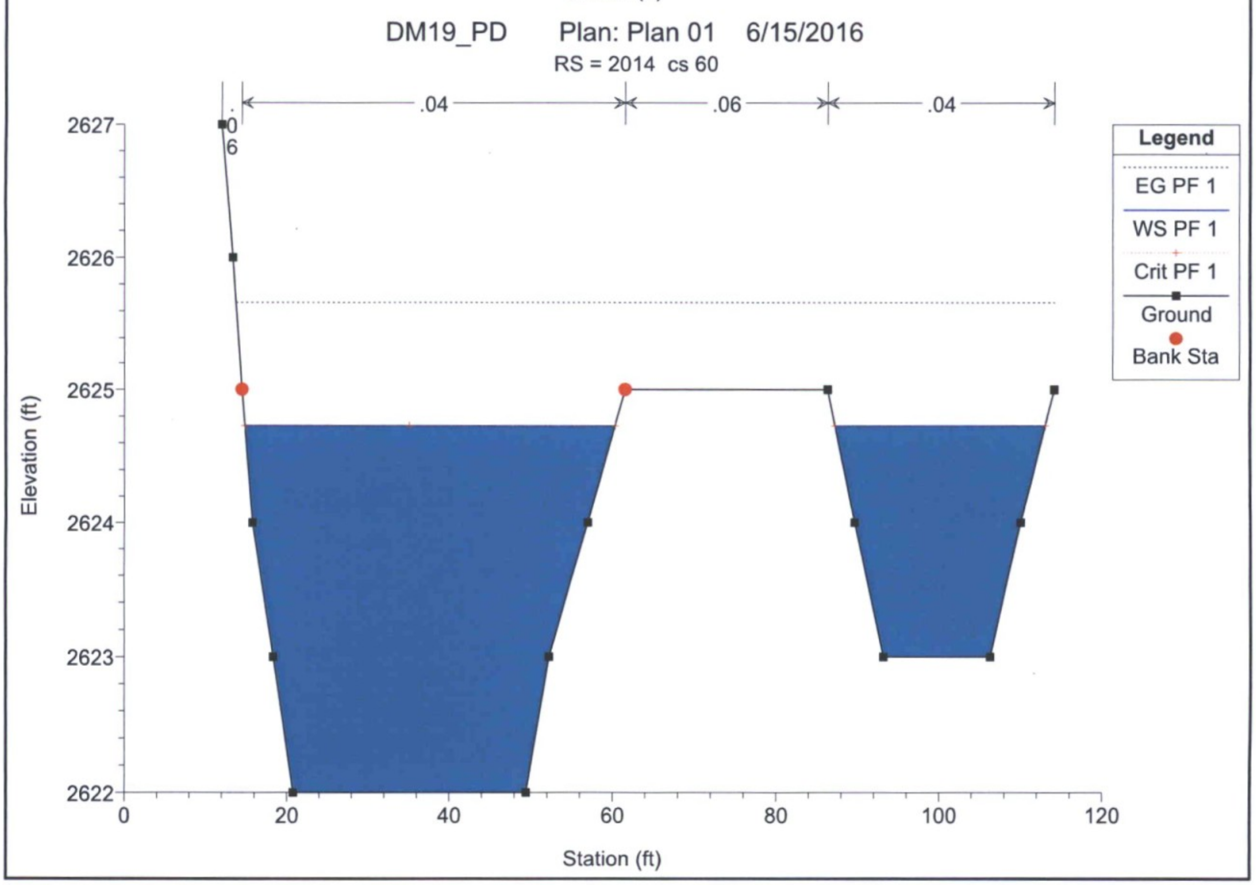

DM19_PD Plan: Plan 01 6/15/2016
RS = 2500
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
2642
2640
2638
2636
2634
2632
0
20
40
60
80
100
120
140
160
Station (ft)

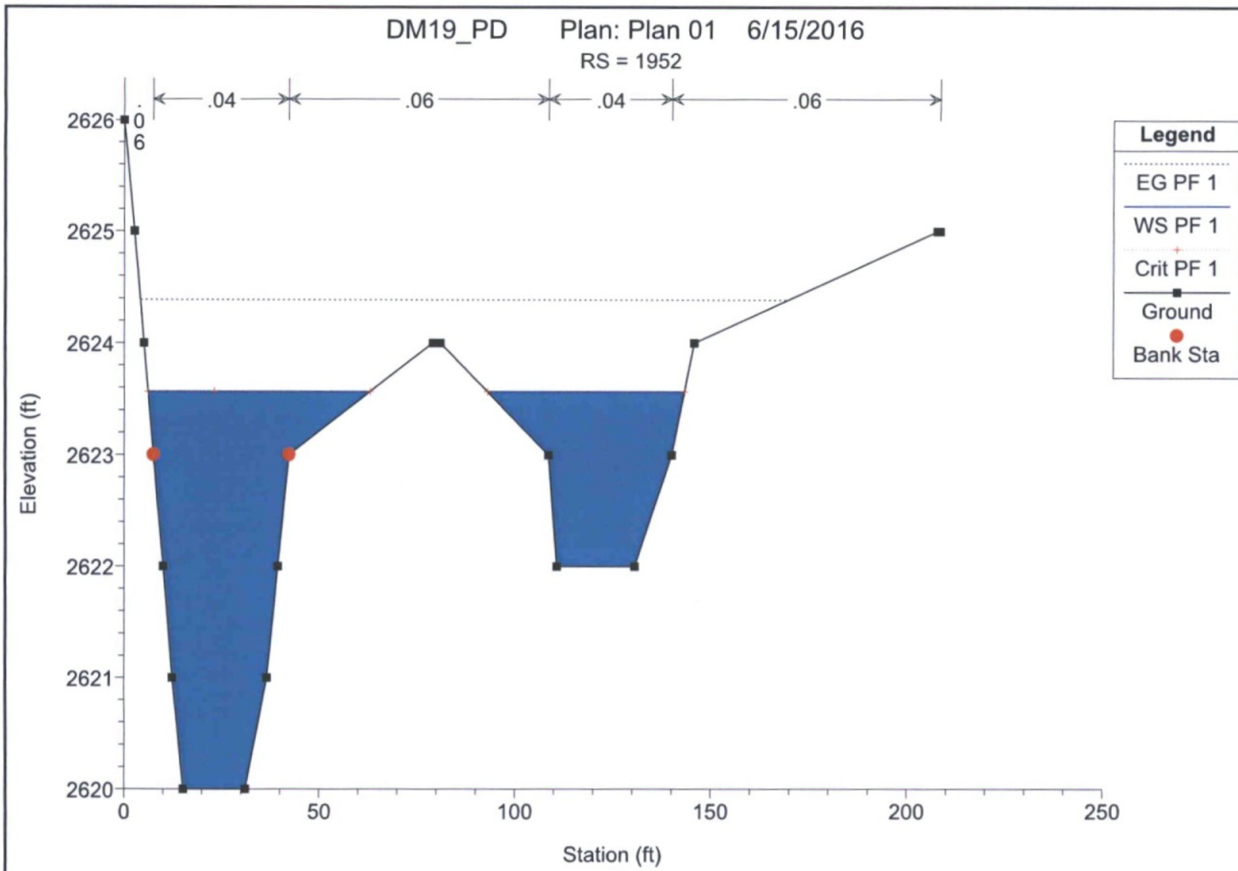

DM19_PD Plan: Plan 01 6/15/2016
RS = 2405
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2637
2636
2635
2634
2633
2632
2631
2630
0
20
40
60
80
100
120
140
Station (ft)

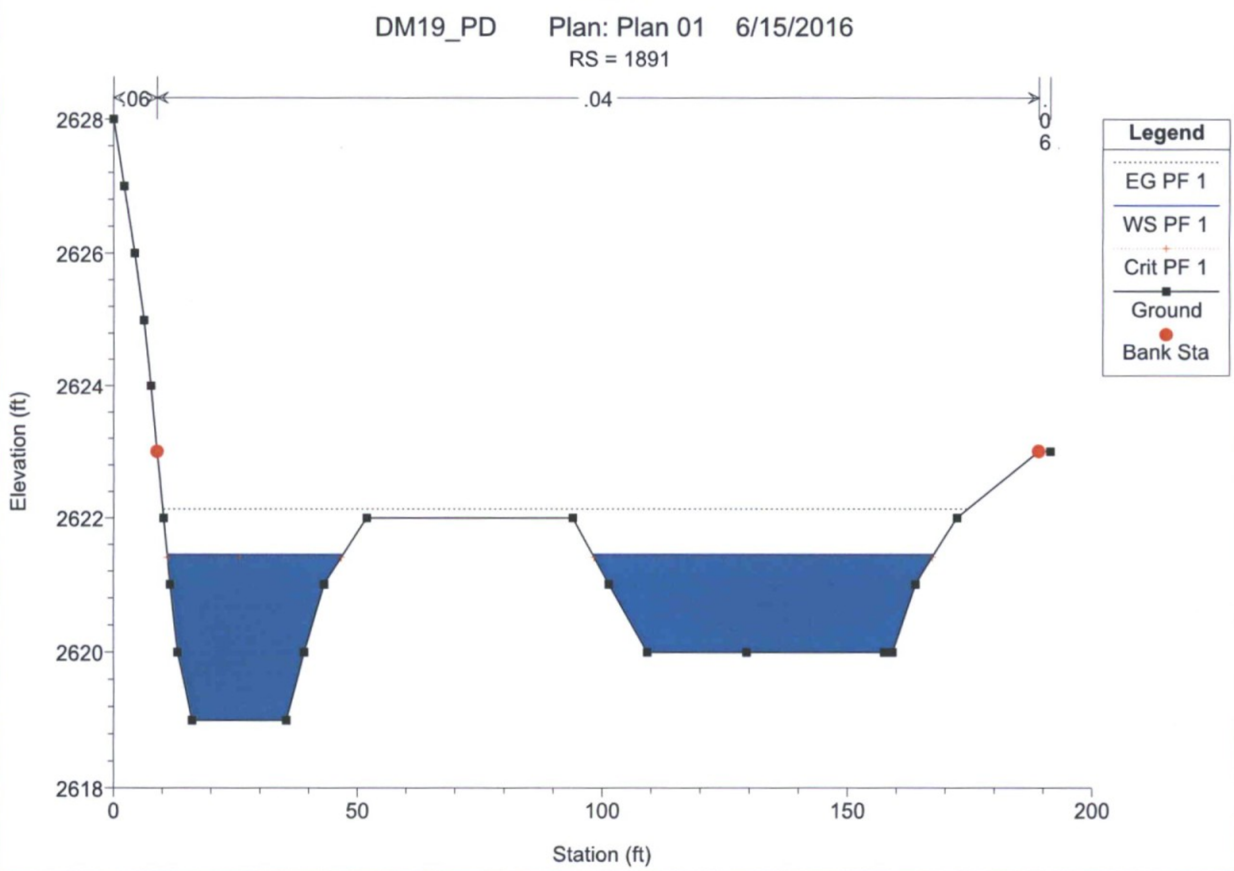

DM19_PD Plan: Plan 01 6/15/2016
RS = 2250
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2636
2634
2632
2630
2628
2626
0
20
40
60
80
100
120
140
160
Station (ft)

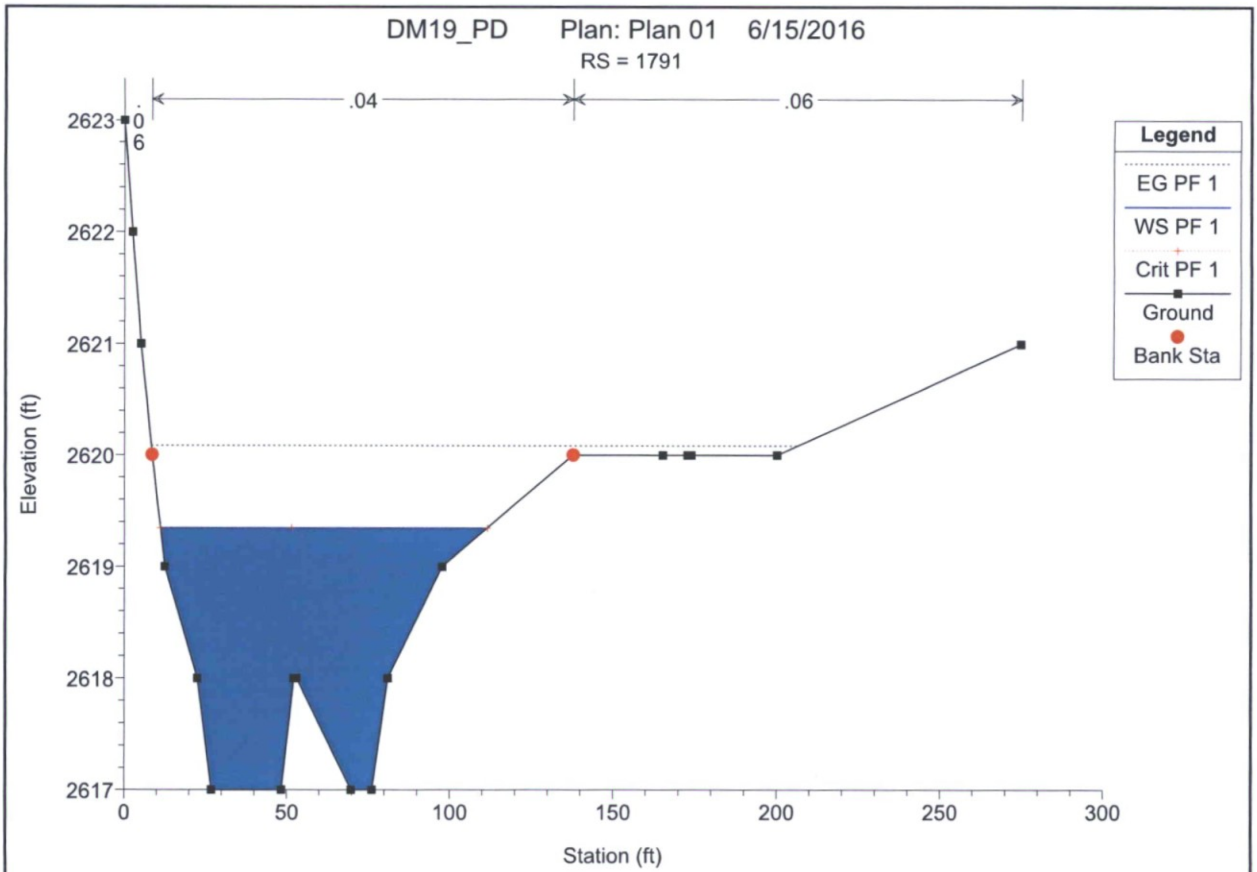

DM19_PD Plan: Plan 01 6/15/2016
RS = 2130
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2631
2630
2629
2628
2627
2626
2625
2624
0
20
40
60
80
100
120
Station (ft)

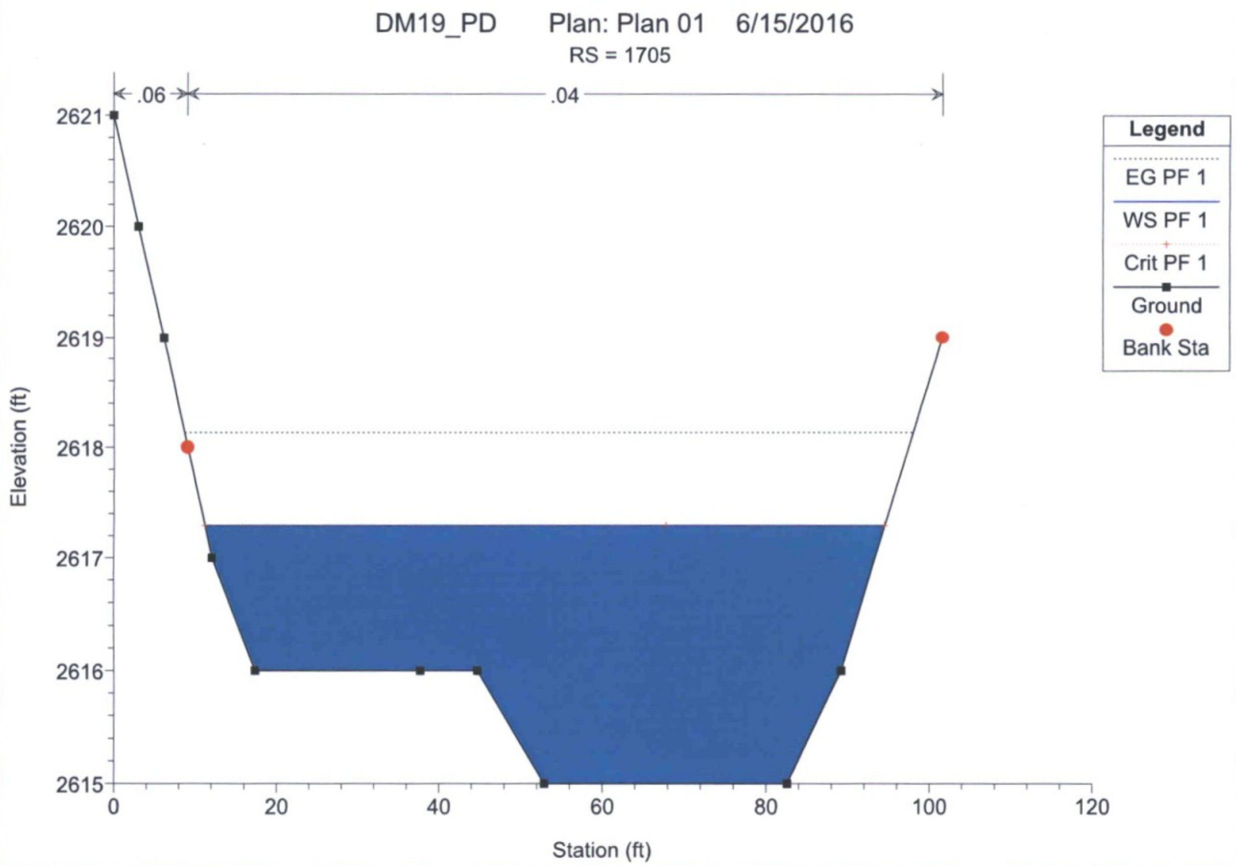

DM19_PD Plan: Plan 01 6/15/2016
RS = 2056
.04
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2627
2626
2625
2624
2623
0
20
40
60
80
100
120
Station (ft)

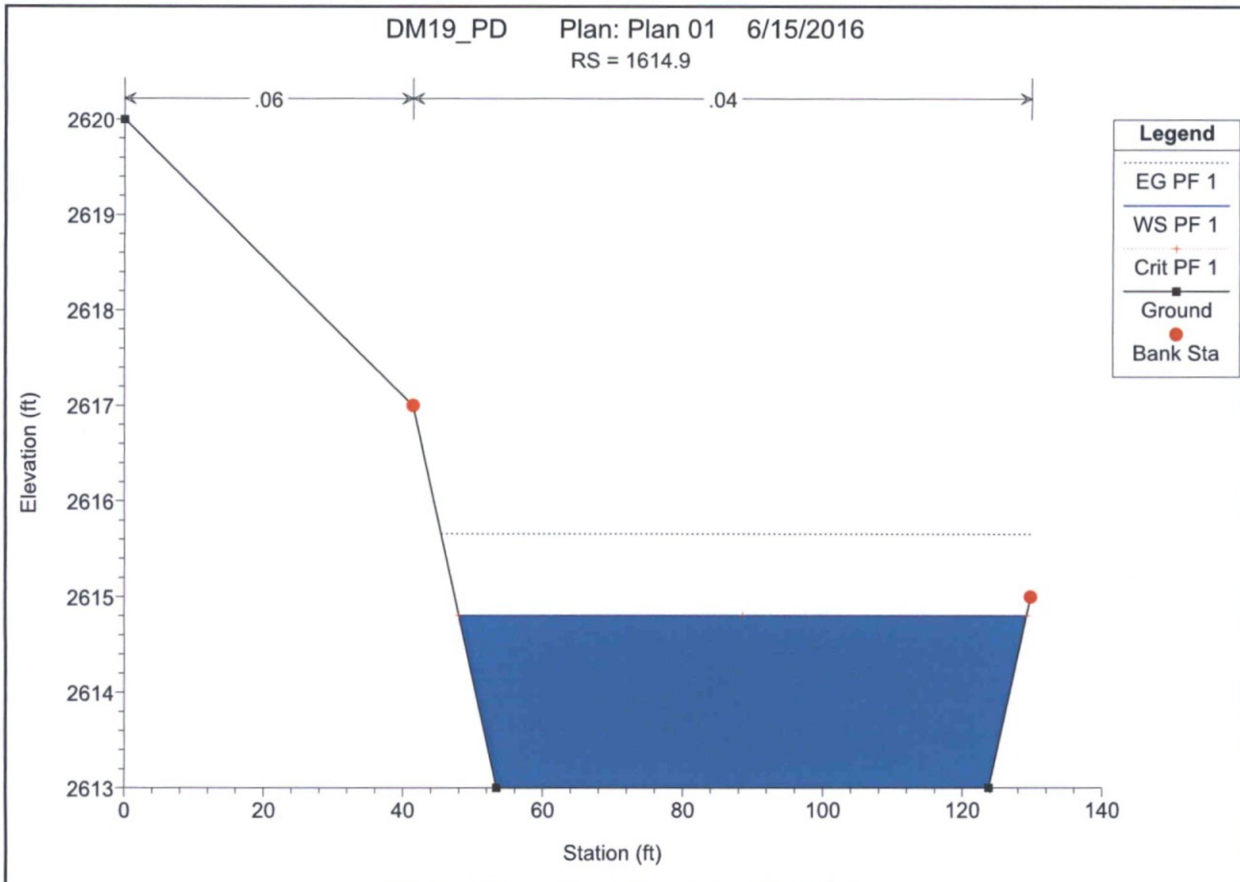

DM19_PD Plan: Plan 01 6/15/2016
RS = 2014 cs 60
.06
.04
.06
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2627
2626
2625
2624
2623
2622
0
20
40
60
80
100
120
Station (ft)

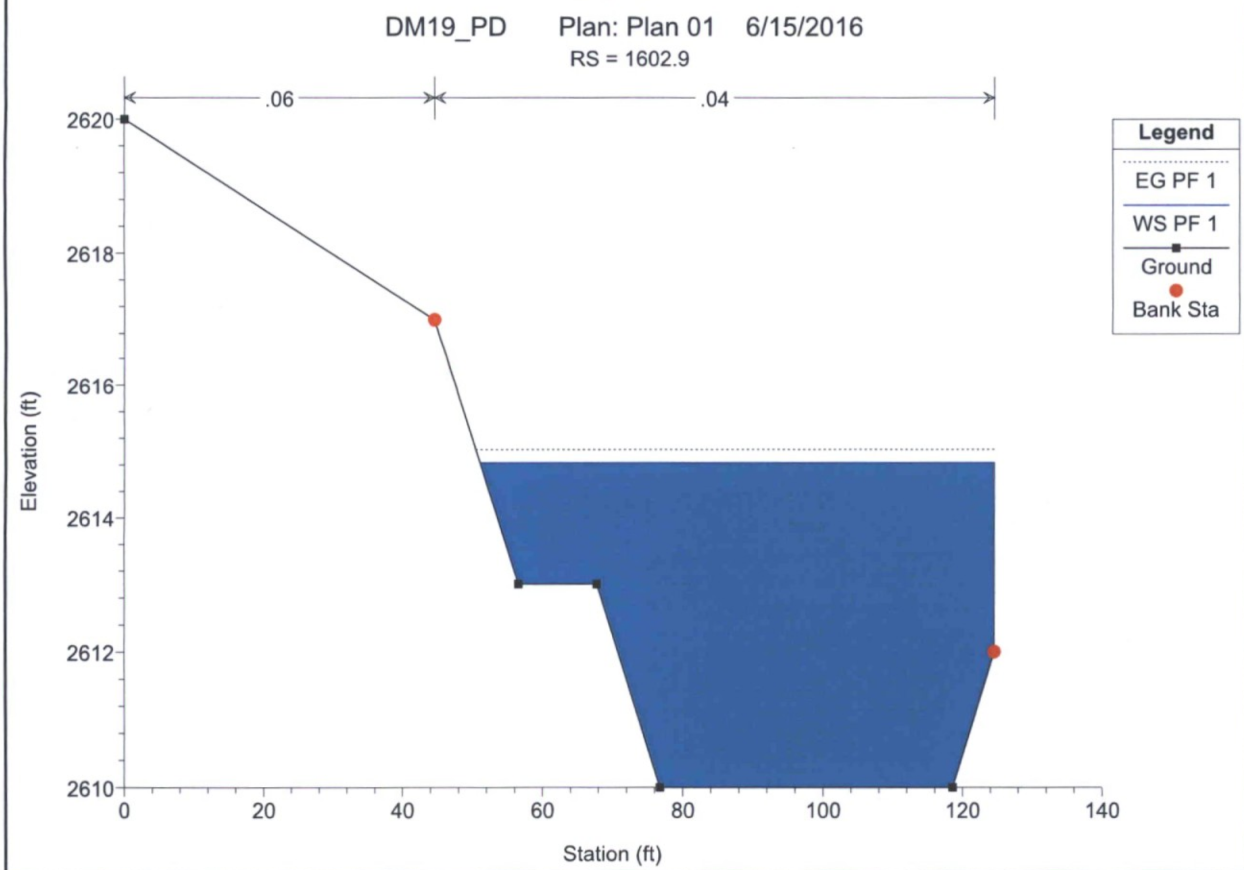

DM19_PD Plan: Plan 01 6/15/2016
RS = 1952
.04
.06
.04
.06
.0 6
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2626
2625
2624
2623
2622
2621
2620
0
50
100
150
200
250

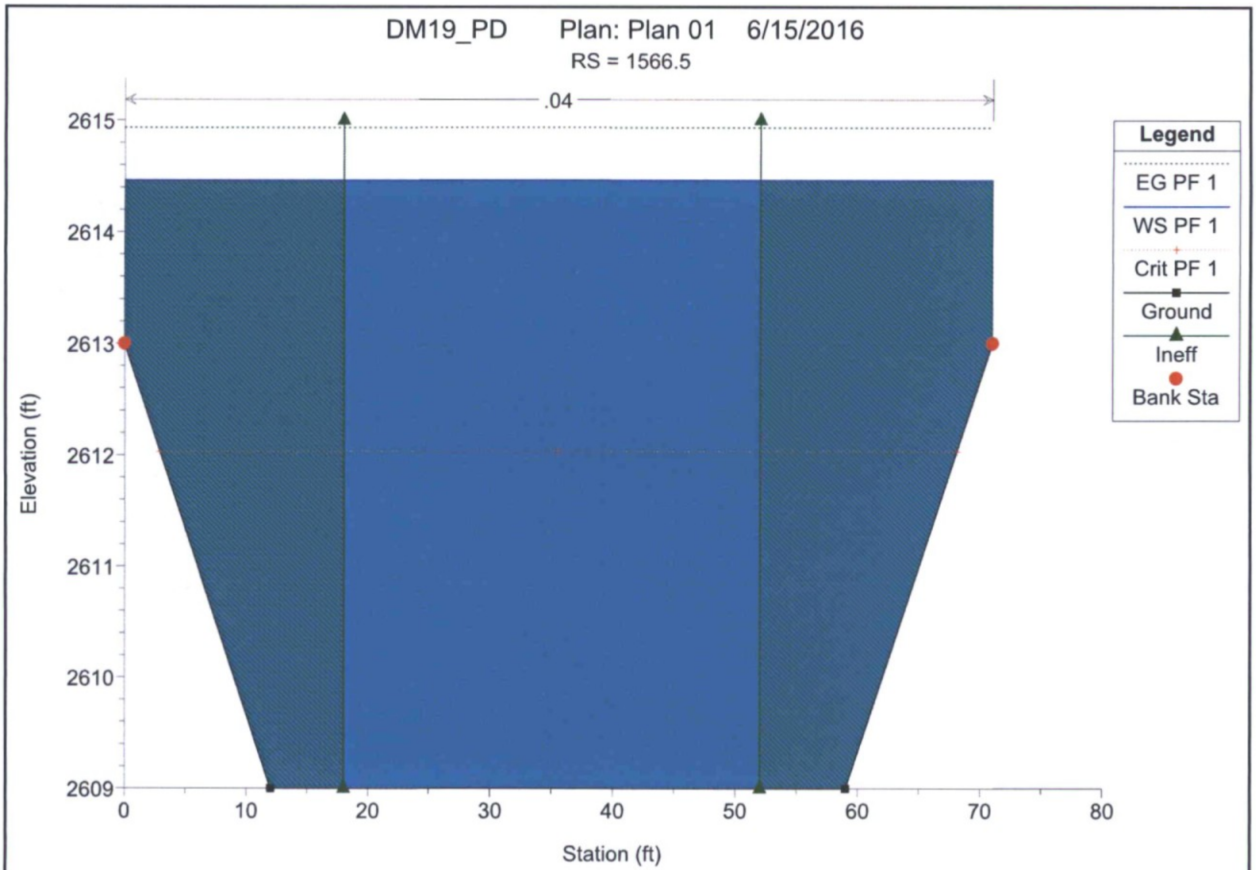

DM19_PD Plan: Plan 01 6/15/2016
RS = 1891
.06
.04
.0 6
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2628
2626
2624
2622
2620
2618
0
50
100
150
200

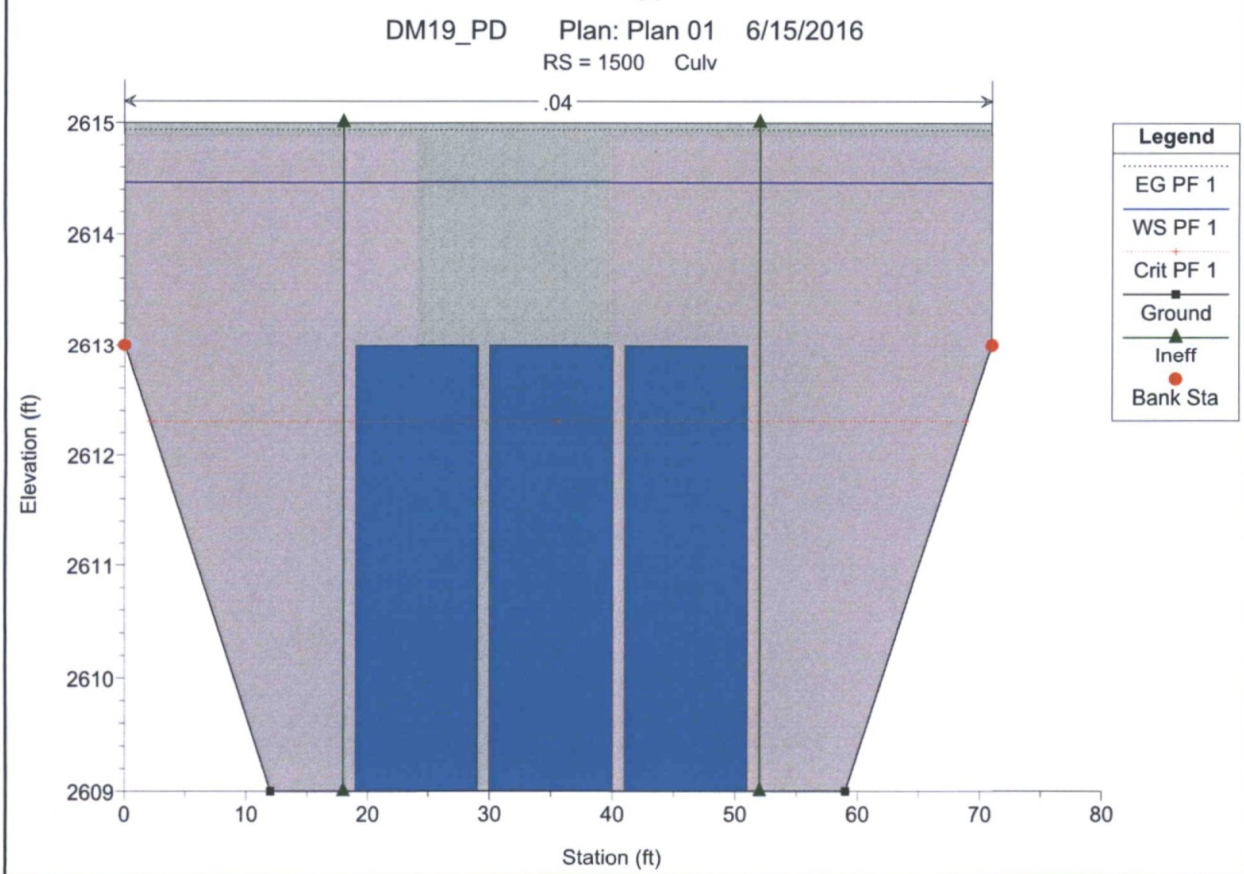

DM19_PD Plan: Plan 01 6/15/2016
RS = 1791
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

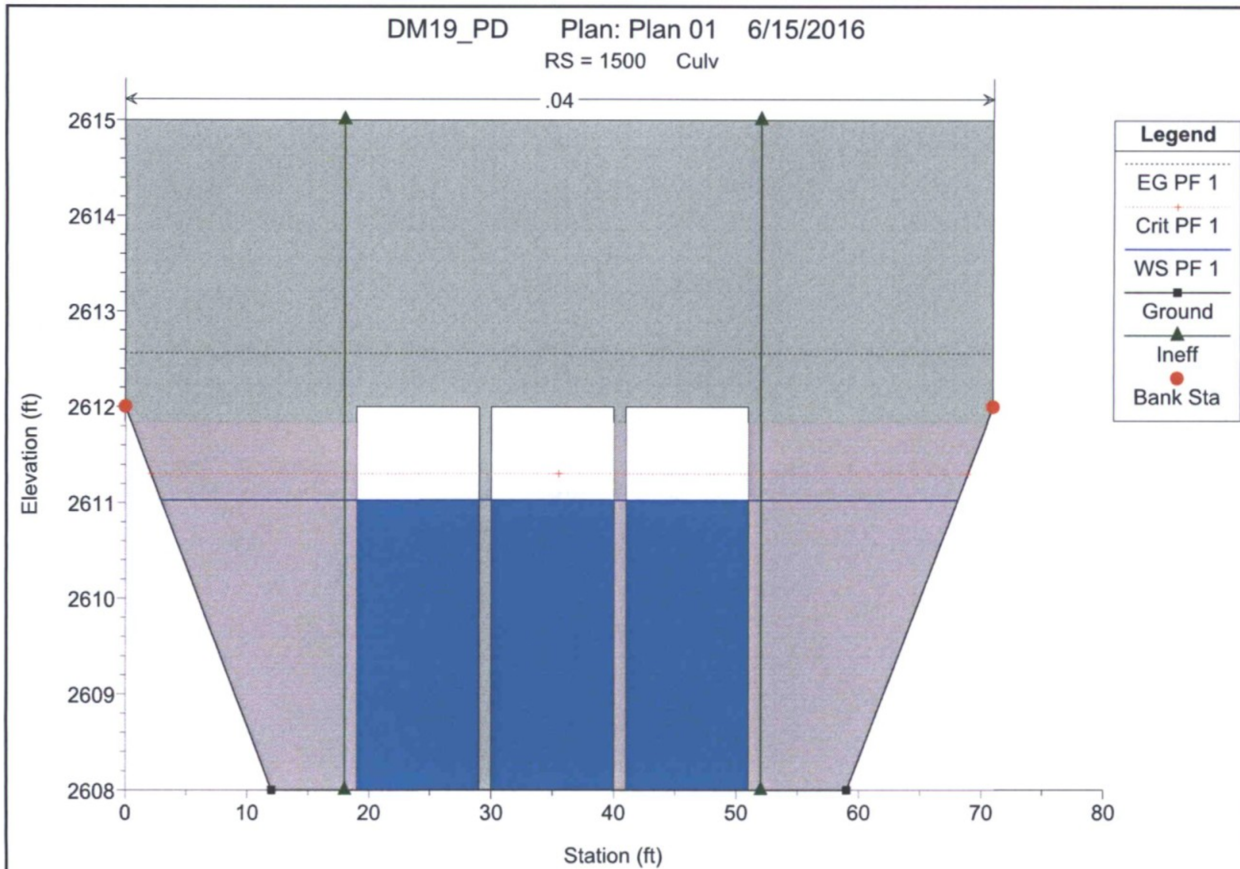

DM19_PD Plan: Plan 01 6/15/2016
RS = 1705
.06
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

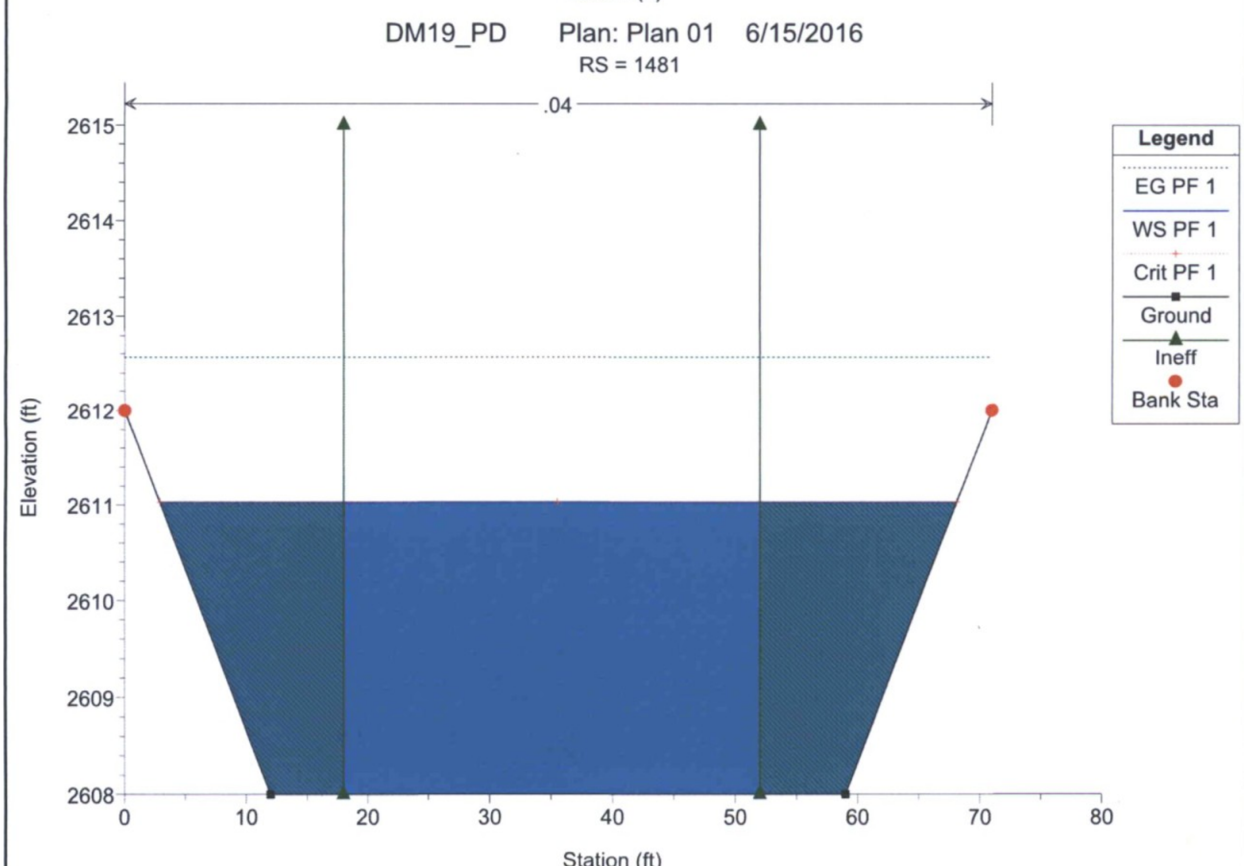

DM19_PD Plan: Plan 01 6/15/2016
RS = 1614.9
.06
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2620
2619
2618
2617
2616
2615
2614
2613
0
20
40
60
80
100
120
140
Station (ft)

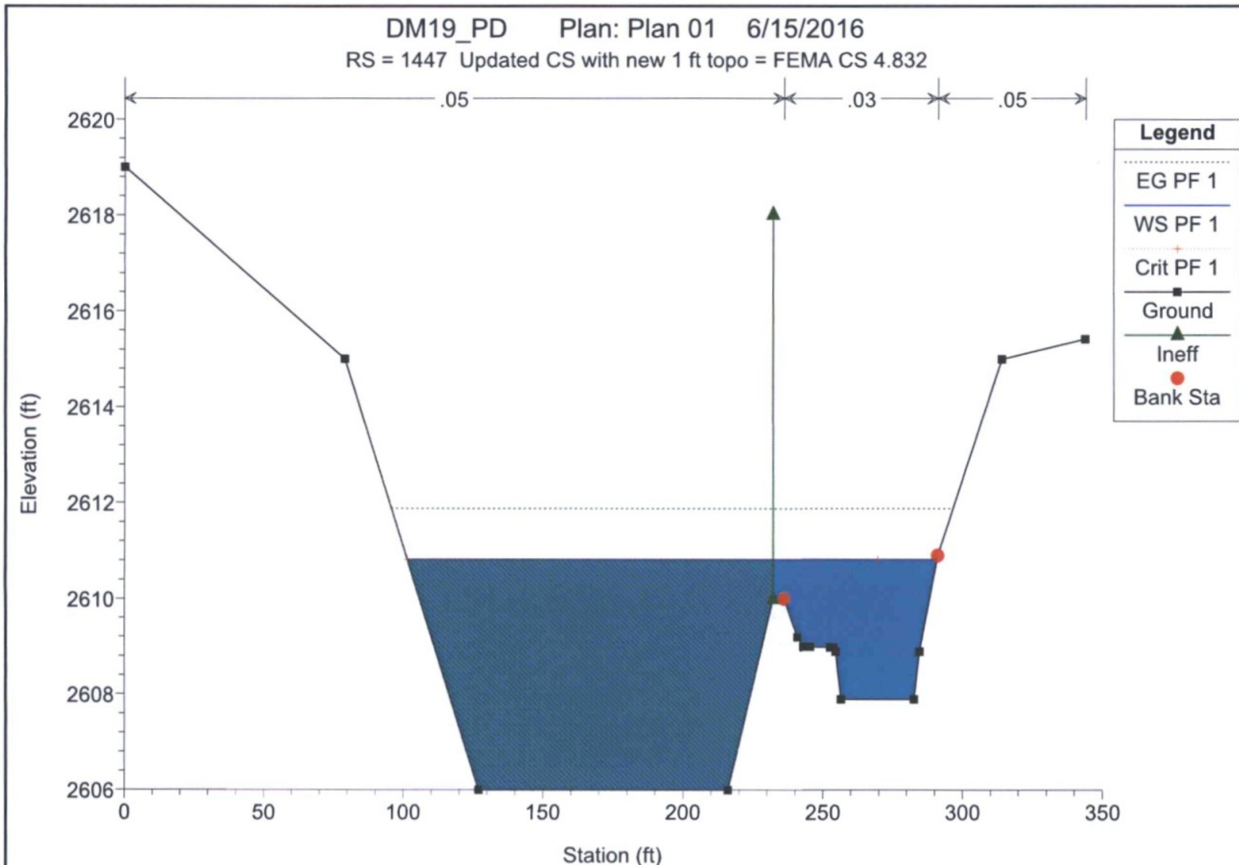

DM19_PD Plan: Plan 01 6/15/2016
RS = 1602.9
.06
.04
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2620
2618
2616
2614
2612
2610
0
20
40
60
80
100
120
140
Station (ft)


DM19_PD Plan: Plan 01 6/15/2016
RS = 1566.5
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
2609
2610
2611
2612
2613
2614
2615
Station (ft)
0
10
20
30
40
50
60
70
80

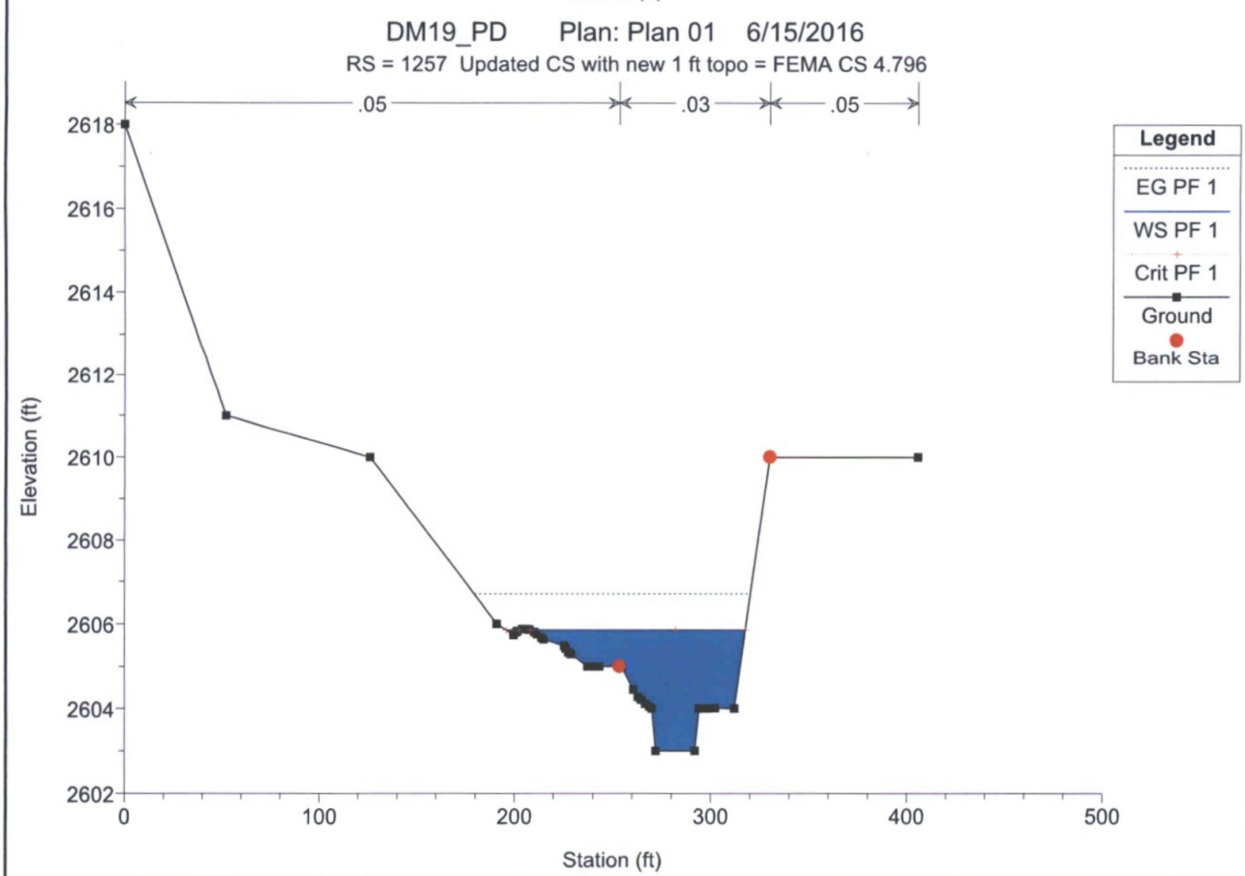

DM19_PD Plan: Plan 01 6/15/2016
RS = 1500 Culv
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
2609
2610
2611
2612
2613
2614
2615
Station (ft)
0
10
20
30
40
50
60
70
80


DM19_PD Plan: Plan 01 6/15/2016
RS = 1500 Culv
.04
2615
2614
2613
2612
2611
2610
2609
2608
Elevation (ft)
0
10
20
30
40
50
60
70
80
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Ineff
Bank Sta

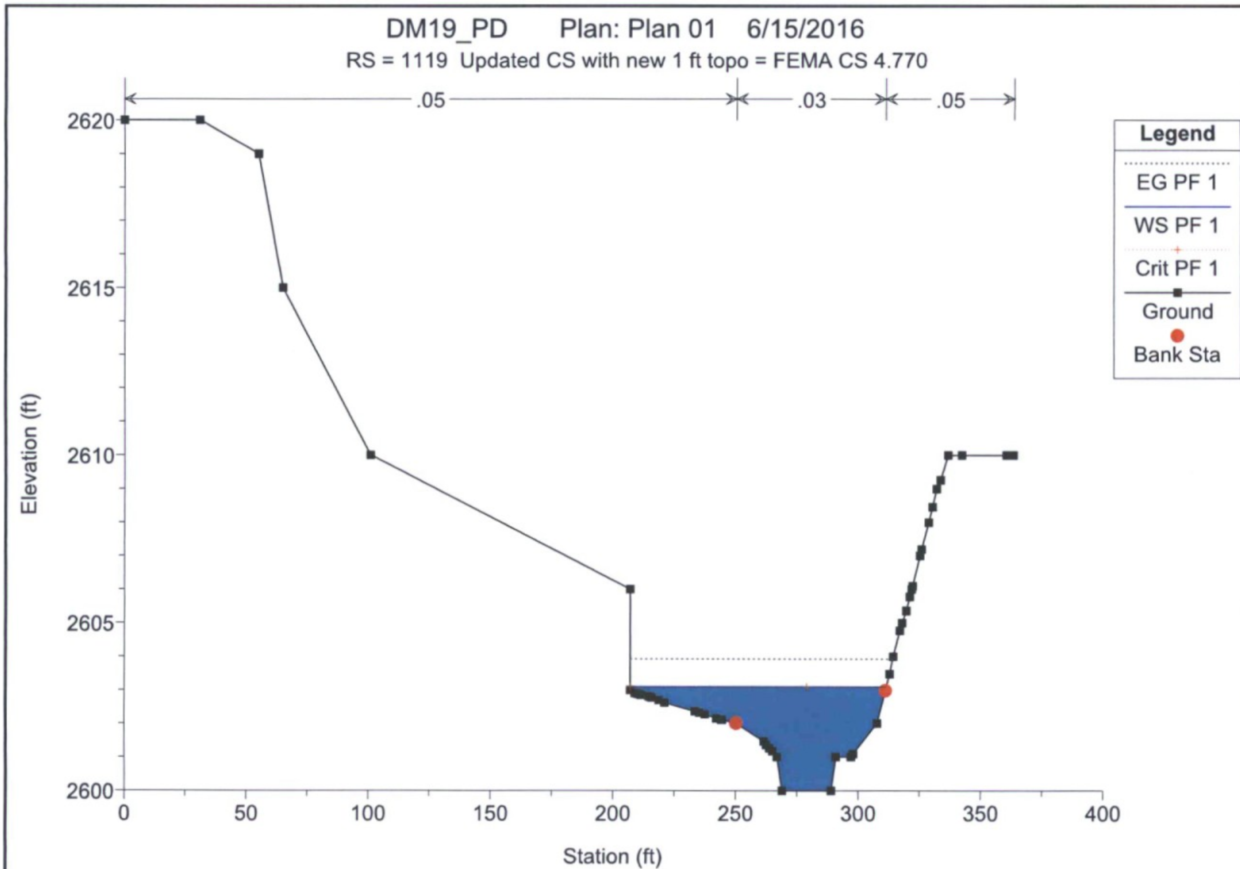

DM19_PD Plan: Plan 01 6/15/2016
RS = 1481
.04
2615
2614
2613
2612
2611
2610
2609
2608
Elevation (ft)
0
10
20
30
40
50
60
70
80
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta

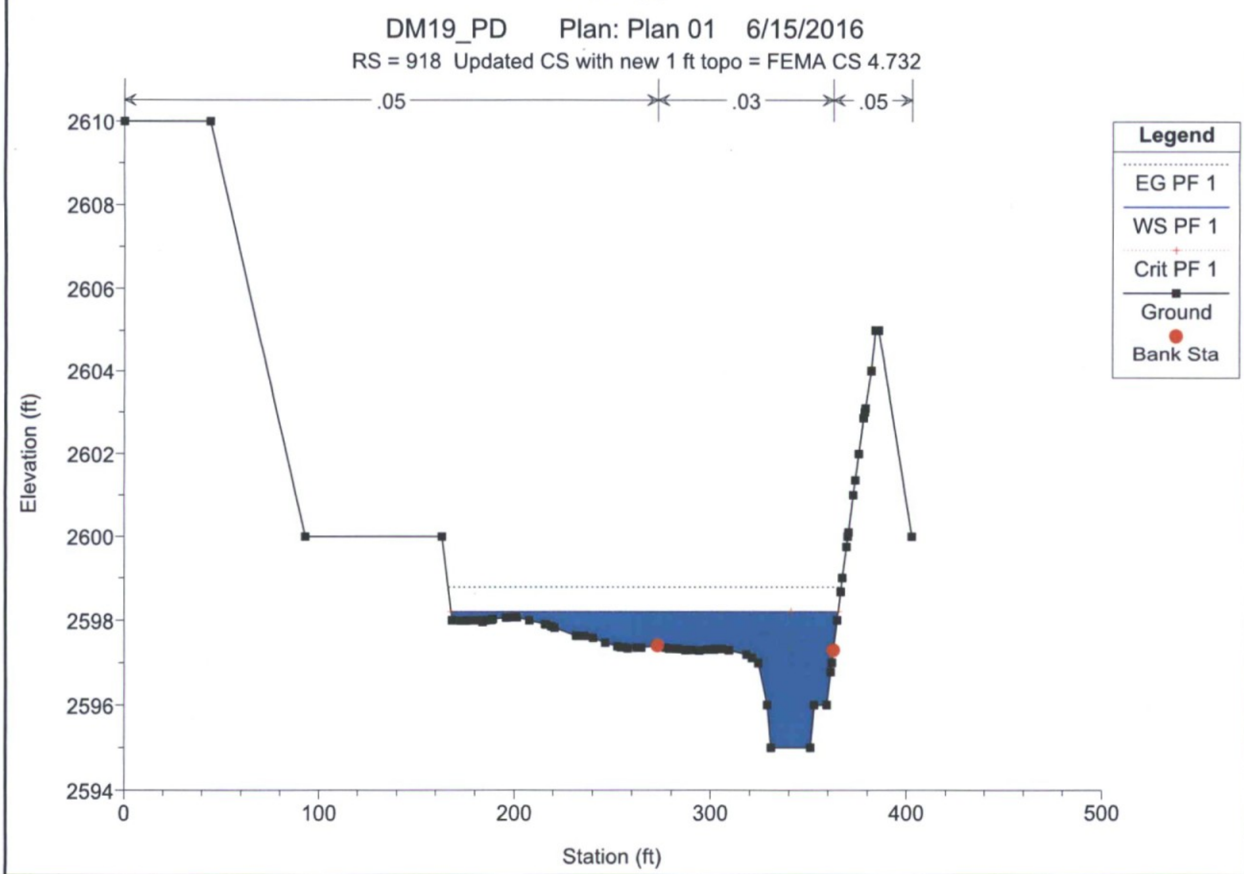


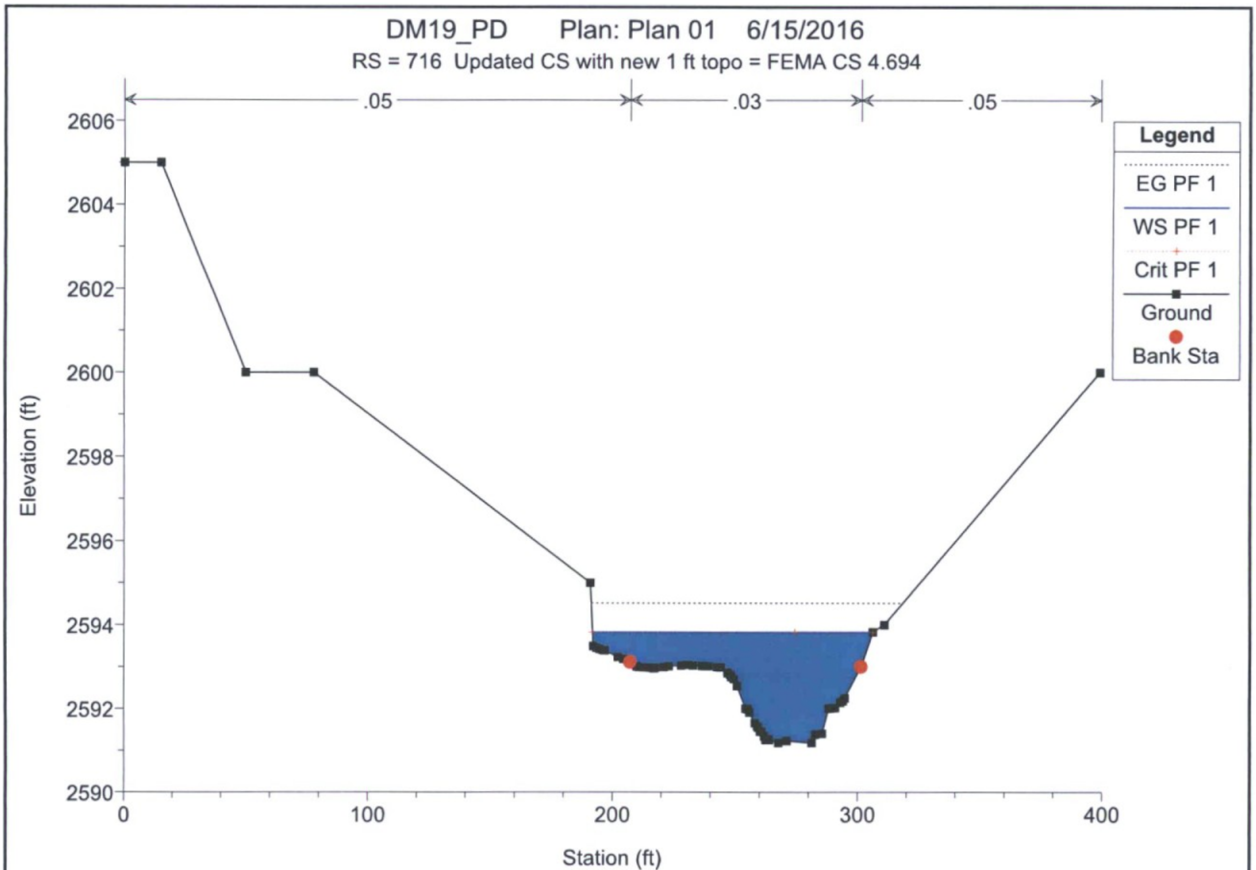
DM19_PD Plan: Plan 01 6/15/2016
RS = 1447 Updated CS with new 1 ft topo = FEMA CS 4.832
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
2620
2618
2616
2614
2612
2610
2608
2606
0
50
100
150
200
250
300
350
Station (ft)

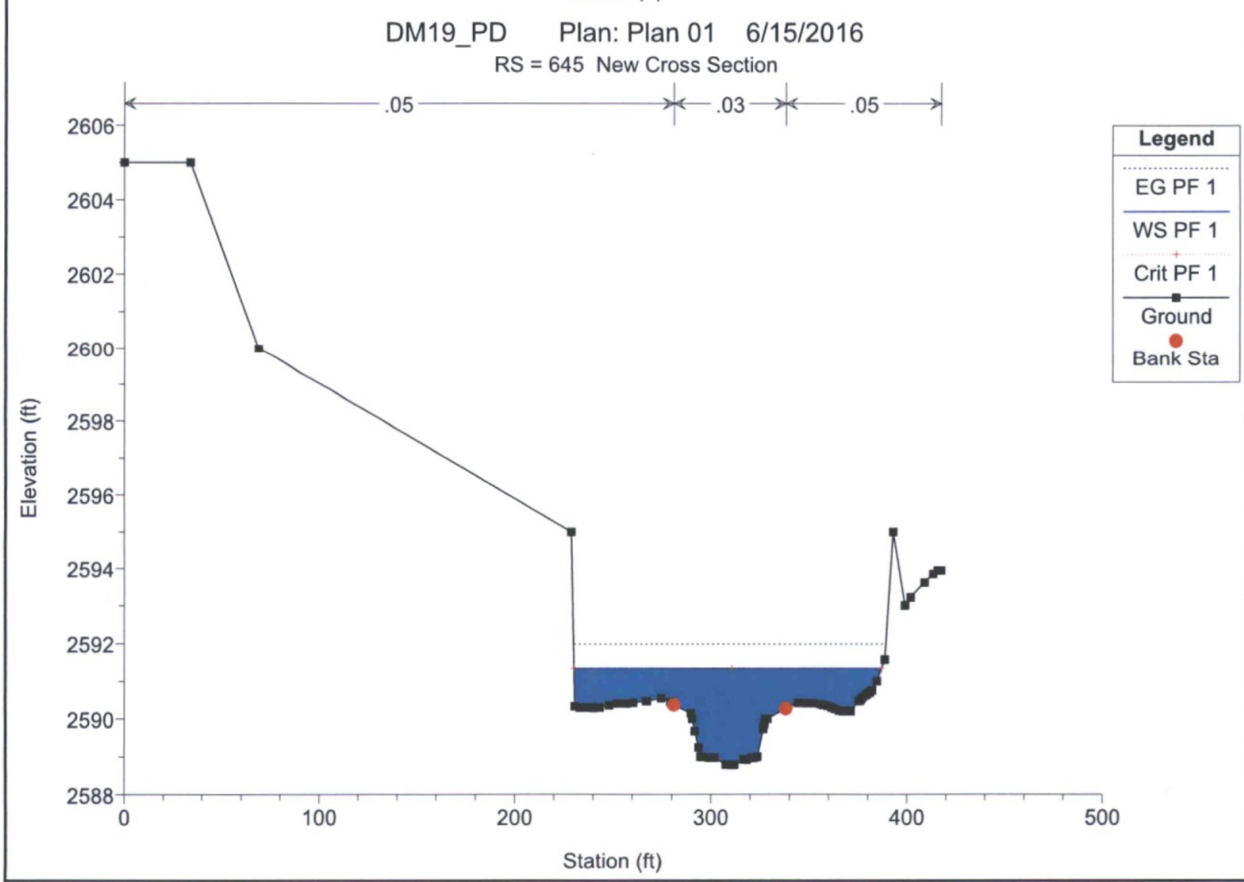


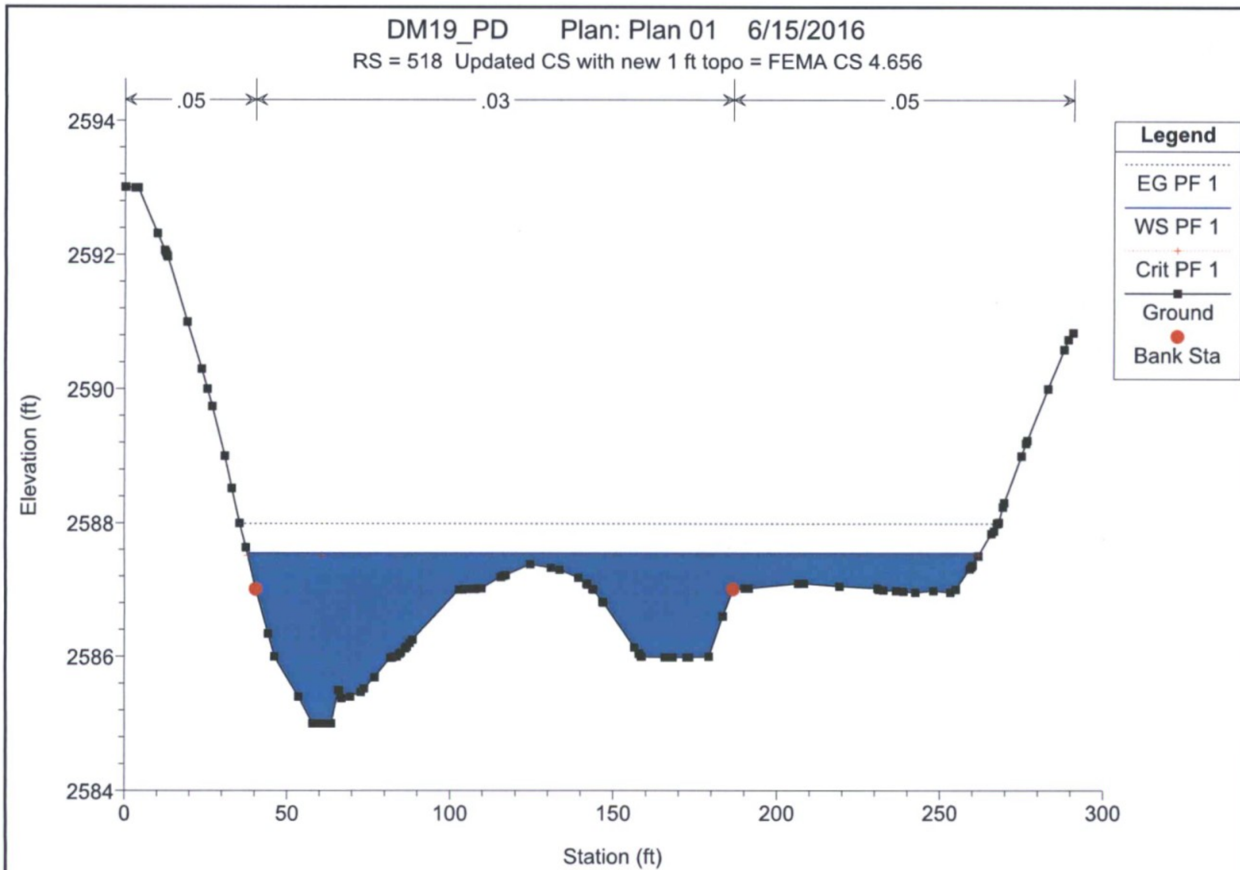
DM19_PD Plan: Plan 01 6/15/2016
RS = 1257 Updated CS with new 1 ft topo = FEMA CS 4.796
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2618
2616
2614
2612
2610
2608
2606
2604
2602
0
100
200
300
400
500
Station (ft)

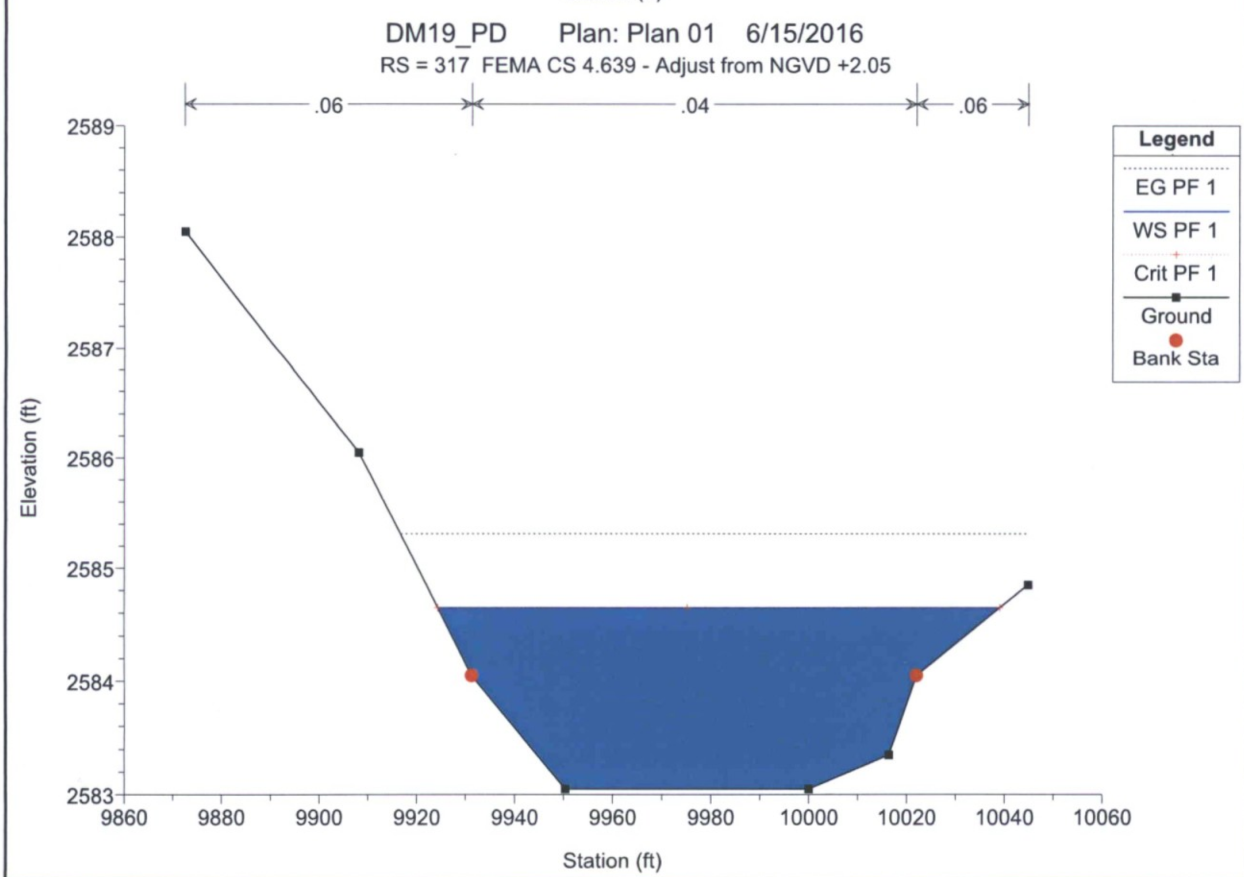

DM19_PD Plan: Plan 01 6/15/2016
RS = 1119 Updated CS with new 1 ft topo = FEMA CS 4.770
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2620
2615
2610
2605
2600
0
50
100
150
200
250
300
350
400
Station (ft)

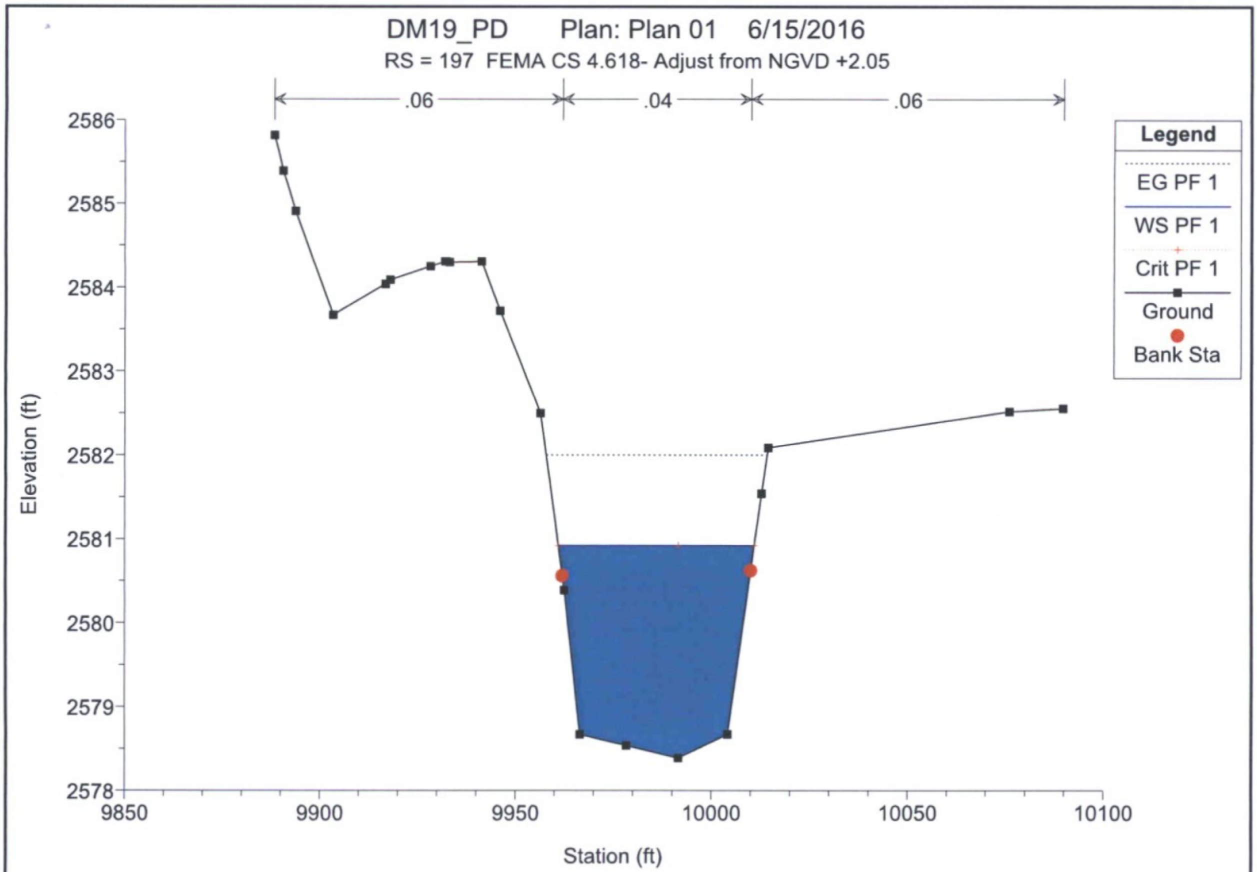

DM19_PD Plan: Plan 01 6/15/2016
RS = 918 Updated CS with new 1 ft topo = FEMA CS 4.732
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2610
2608
2606
2604
2602
2600
2598
2596
2594
0
100
200
300
400
500
Station (ft)

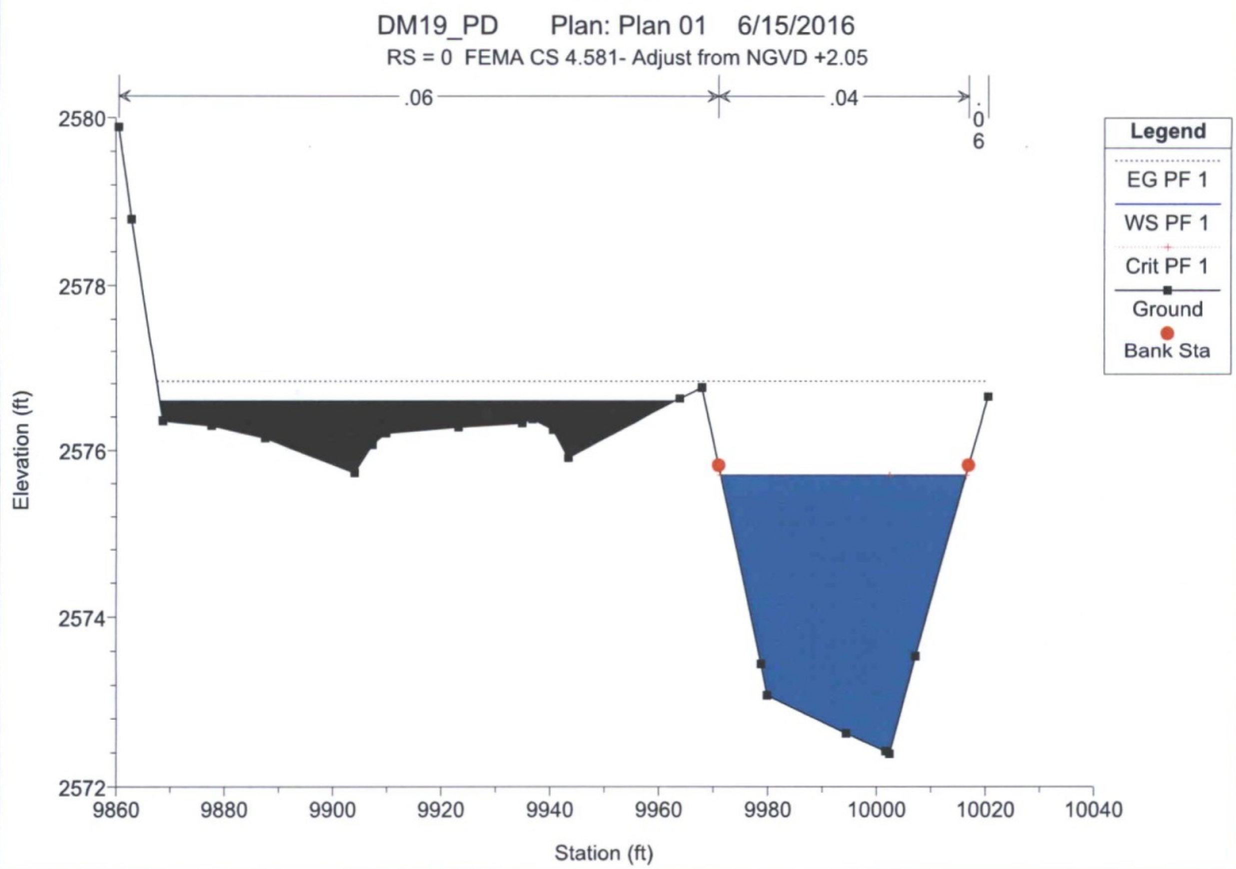

DM19_PD Plan: Plan 01 6/15/2016
RS = 716 Updated CS with new 1 ft topo = FEMA CS 4.694
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2606
2604
2602
2600
2598
2596
2594
2592
2590
0
100
200
300
400
Station (ft)


DM19_PD Plan: Plan 01 6/15/2016
RS = 645 New Cross Section
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2606
2604
2602
2600
2598
2596
2594
2592
2590
2588
0
100
200
300
400
500
Station (ft)


DM19_PD Plan: Plan 01 6/15/2016
RS = 518 Updated CS with new 1 ft topo = FEMA CS 4.656
.05
.03
.05
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2594
2592
2590
2588
2586
2584
0
50
100
150
200
250
300
Station (ft)


DM19_PD Plan: Plan 01 6/15/2016
RS = 317 FEMA CS 4.639 - Adjust from NGVD +2.05
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2589
2588
2587
2586
2585
2584
2583
9860
9880
9900
9920
9940
9960
9980
10000
10020
10040
10060
Station (ft)


DM19_PD Plan: Plan 01 6/15/2016
RS = 197 FEMA CS 4.618- Adjust from NGVD +2.05
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2586
2585
2584
2583
2582
2581
2580
2579
2578
9850
9900
9950
10000
10050
10100
Station (ft)


DM19_PD Plan: Plan 01 6/15/2016
RS = 0 FEMA CS 4.581- Adjust from NGVD +2.05
.06
.04
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2580
2578
2576
2574
2572
9860
9880
9900
9920
9940
9960
9980
10000
10020
10040
Station (ft)

HEC-RAS Plan: Plan 01 River: DM19 Reach: Profile baseline Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Profile baseline	2774	1012.00	2641.90	2643.86	2643.86	2644.66	0.020167	7.19	140.92	90.46	1.00
Profile baseline	2678	1012.00	2639.92	2641.86	2641.86	2642.59	0.016480	6.99	163.50	132.82	0.92
Profile baseline	2578	1012.00	2634.45	2638.99		2639.35	0.003594	4.82	209.95	64.34	0.47
Profile baseline	2540	1012.00	2633.32	2638.68	2636.62	2639.21	0.002881	5.88	172.24	72.12	0.46
Profile baseline	2520	Culvert									
Profile baseline	2500	1012.00	2633.00	2636.01	2636.01	2637.53	0.016380	9.90	102.20	64.35	1.01
Profile baseline	2405	1012.00	2630.14	2633.15	2633.09	2634.22	0.016536	8.31	123.48	55.97	0.96
Profile baseline	2250	1012.00	2626.98	2630.28	2630.28	2631.62	0.016755	9.27	110.19	46.98	0.98
Profile baseline	2130	1012.00	2624.00	2626.99	2626.98	2628.02	0.018886	8.14	124.27	60.32	1.00
Profile baseline	2056	1012.00	2623.00	2625.66	2625.66	2626.51	0.020458	7.42	136.31	81.23	1.01
Profile baseline	2014	1012.00	2622.00	2624.73	2624.73	2625.66	0.017239	8.15	134.02	71.27	0.97
Profile baseline	1952	1012.00	2620.00	2623.56	2623.56	2624.38	0.011822	7.94	153.49	107.14	0.83
Profile baseline	1891	1012.00	2619.00	2621.45	2621.41	2622.13	0.019903	6.64	152.39	105.72	0.97
Profile baseline	1791	1012.00	2617.00	2619.35	2619.35	2620.09	0.020971	6.90	146.65	100.43	1.01
Profile baseline	1705	1012.00	2615.00	2617.29	2617.29	2618.13	0.020197	7.35	137.63	83.30	1.01
Profile baseline	1614.9	1012.00	2613.00	2614.81	2614.81	2615.66	0.019987	7.40	136.75	81.17	1.00
Profile baseline	1602.9	1012.00	2610.00	2614.83		2615.03	0.001702	3.61	280.14	73.48	0.33
Profile baseline	1570	Lat Struct									
Profile baseline	1566.5	1022.00	2609.00	2614.46	2612.03	2614.93	0.002280	5.50	185.74	71.00	0.41
Profile baseline	1500	Culvert									
Profile baseline	1481	1022.00	2608.00	2611.03	2611.03	2612.56	0.016291	9.93	102.97	65.17	1.01
Profile baseline	1447	1022.00	2607.90	2610.82	2610.82	2611.88	0.009809	8.30	125.44	189.41	0.98
Profile baseline	1257	1022.00	2603.00	2605.85	2605.85	2606.71	0.009504	7.59	153.46	115.91	0.95
Profile baseline	1119	1022.00	2600.00	2603.09	2603.09	2603.92	0.008530	7.50	155.99	104.42	0.91
Profile baseline	918	1022.00	2595.00	2598.20	2598.20	2598.78	0.008361	6.33	197.76	197.40	0.86
Profile baseline	716	1022.00	2591.19	2593.82	2593.82	2594.52	0.011845	6.70	153.95	114.34	1.00
Profile baseline	645	1022.00	2588.78	2591.34	2591.34	2591.98	0.008972	7.19	199.69	156.65	0.92
Profile baseline	518	1022.00	2585.00	2587.54	2587.51	2587.99	0.009998	5.52	210.58	224.44	0.90
Profile baseline	317	861.00	2583.05	2584.65	2584.65	2585.31	0.019510	6.57	136.54	114.75	0.97
Profile baseline	197	861.00	2578.39	2580.92	2580.92	2582.00	0.018503	8.34	103.55	49.95	1.00
Profile baseline	0	861.00	2572.39	2575.70	2575.70	2576.83	0.018487	8.54	100.84	45.09	1.01

Scour Calculations

GALLOWAY WASH

Level 1 Analysis of Stream Degradation

Reference: ADWR, Flood Warning and Dam Safety Section, 1996.
State Standard 5-96: "Watercourse System Sediment Balance - Guideline 2: Channel Degradation Estimation for Alluvial Channels in Arizona"

Assumptions: Channel reaches without major disturbances, such as dams and bridges.

Equations:

Ds = Dgs + Dlts

where:
- Ds = total scour depth, in feet;
- Dgs = general degradation, in feet;
- Dlts = long term degradation, in feet;

For straight channel reaches:
Dgs = 0.157*Q100^0.4

For channel reaches with curvature:
Dgs = 0.219*Q100^0.4

Long term degradation:
Dlts = 0.02*Q100^0.6

Project Name: DM 19 **Location:** Galloway Wash

Input Data:

Q100 = 1025 cfs

Ds =	3.79 ft	for straight channel
Ds =	4.79 ft	otherwise

Recommended Scour Depth = 5.0 ft

Note: the minimum total scour depth, Ds, shall be 3 feet.

WASH A

Level 1 Analysis of Stream Degradation

Reference: ADWR, Flood Warning and Dam Safety Section, 1996.
State Standard 5-96: "Watercourse System Sediment Balance - Guideline 2: Channel Degradation Estimation for Alluvial Channels in Arizona"

Assumptions: Channel reaches without major disturbances, such as dams and bridges.

Equations:

Ds = Dgs + Dlts

where:
- Ds = total scour depth, in feet;
- Dgs = general degradation, in feet;
- Dlts = long term degradation, in feet;

For straight channel reaches:
Dgs = 0.157*Q100^0.4

For channel reaches with curvature:
Dgs = 0.219*Q100^0.4

Long term degradation:
Dlts = 0.02*Q100^0.6

Project Name: DM 19 **Location:** Wash A

Input Data:
Q100 = 468 cfs

Ds =	2.64 ft	for straight channel
Ds =	3.36 ft	otherwise

Recommended Scour Depth = 4.0 ft

Note: the minimum total scour depth, Ds, shall be 3 feet.

Erosion Hazard Setback Calculations

GALLOWAY WASH

WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project:	*Desert Mountain Parcel 19*
Location:	*Phoenix, Maricopa County Arizona*
Date:	*16-Jun-16*
References:	Storm Water Policies & Standards, City of Phoenix (12/2013)

ADWR Erosion Hazard Setback Equations
State Standard for Watercourse System Sediment Balance
SSA 5-96, LMSA-5, September 1996

For straight channel reaches or reaches with minor curvature	*setback = 1.0(Q100)^0.5*
For channels with obvious curvature or channel bend	*setback = 2.5(Q100)^0.5*

The setback allowance is to be measured outward from the 100-year floodway
Or the top of the channel bank, whichever is greater

EROSION HAZARD SETBACK CALCULATIONS

Wash Name	Q100 Discharge (cfs)	ADWR Erosion Hazard Setback (EHS) (ft)
Galloway Wash		
Off-Site Wash	1025	80.0
(bend)		
Off-Site Wash	1025	32.0

Note:
The minimum EHS is 20' for Straight Channels

WASH A

WOOD/PATEL

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Project:	*Desert Mountain Parcel 19*
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The setback allowance is to be measured outward from the 100-year floodway
Or the top of the channel bank, whichever is greater

EROSION HAZARD SETBACK CALCULATIONS

Wash Name	Q100 Discharge (cfs)	ADWR Erosion Hazard Setback (EHS) (ft)
Wash A		
Off-Site Wash	468	54
(bend)		
Off-Site Wash	468	22

Note:
The minimum EHS is 20' for Straight Channels

APPENDIX E

Electronic Versions:

PDF of DM 19 Preliminary Drainage Report

DDMSW DM 19 Existing & Proposed ZIP files

Existing & Proposed 2-year, 10-year & 100-year HEC-1 Files

Existing Wash A & Existing & Proposed Galloway Wash HEC-RAS Files

City of Scottsdale, Arizona
Project Name: PRELIMINARY DRAINAGE REPORT FOR DESERT MOUNTAIN PARCEL 19
PREPARED BY WOOD/PATEL

Date Prepared: 06/16/2016

LIST OF ITEMS ON CD:

PDF OF DRAINAGE REPORT FOR DESERT MOUNTAIN PARCEL 19

Computer Program Files
DDMSW BACKUP FILES SUBMITTED:

DM 19 EX.ZIP
DM 19 PROP.ZIP

HEC-1 FILES SUBMITTED:

```
PDR EXISTING MODELS HEC1
2-YEAR MODEL:   DM19EX2.DAT
                DM19EX2.OH1
10-YEAR MODEL:  DM19EX10.DAT
                DM19EX10.OH1
100-YEAR MODEL: DM19EX100.DAT
                DM19EX100.OH1

PDR POST DEVELOPMENT MODELS HEC1
2-YEAR MODEL:   DM19FT2.DAT
                DM19FT2.OH1
10-YEAR MODEL:  DM19FT10.DAT
                DM19FT10.OH1
100-YEAR MODEL: DM19FT100.DAT
                DM19FT100.OH1
```

HEC-RAS EXISTING CONDITION PROJECT Files SUBMITTED:
GALLOWAY WASH
DM19EXISTING.PRJ
DM19EXISTING.F01
DM19EXISTING.G01
DM19EXISTING.P01
DM19EXISTING.R01
DM19EXISTING.O01

WASH A
WASHA.PRJ
WASHA.F01
WASHA.G01
WASHA.P01
WASHA.R01
WASHA.O01

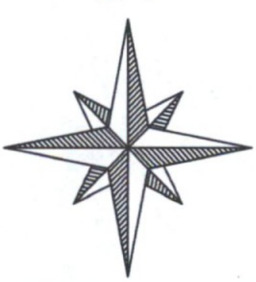
HEC-RAS POST-DEVELOPMENT PROJECT Files SUBMITTED:
GALLOWAY WASH
DM19_PD.PRJ
DM19_PD.F01
DM19_PD.G01
DM19_PD.P01
DM19_PD.R01
DM19_PD.O01

EXHIBIT 1

Vicinity Map

VICINITY MAP

N.T.S.



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DESERT MOUNTAIN 19

EXHIBIT 1
VICINITY MAP

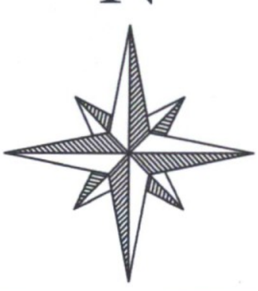
DATE: 06/15/2016	SCALE: N.T.S.	SHEET 1 OF 1
JOB NO.: 164434	DESIGN: RMH DRAWN: RMH	

EXHIBIT 2

ESL Classification Map

VICINITY MAP

N.T.S.



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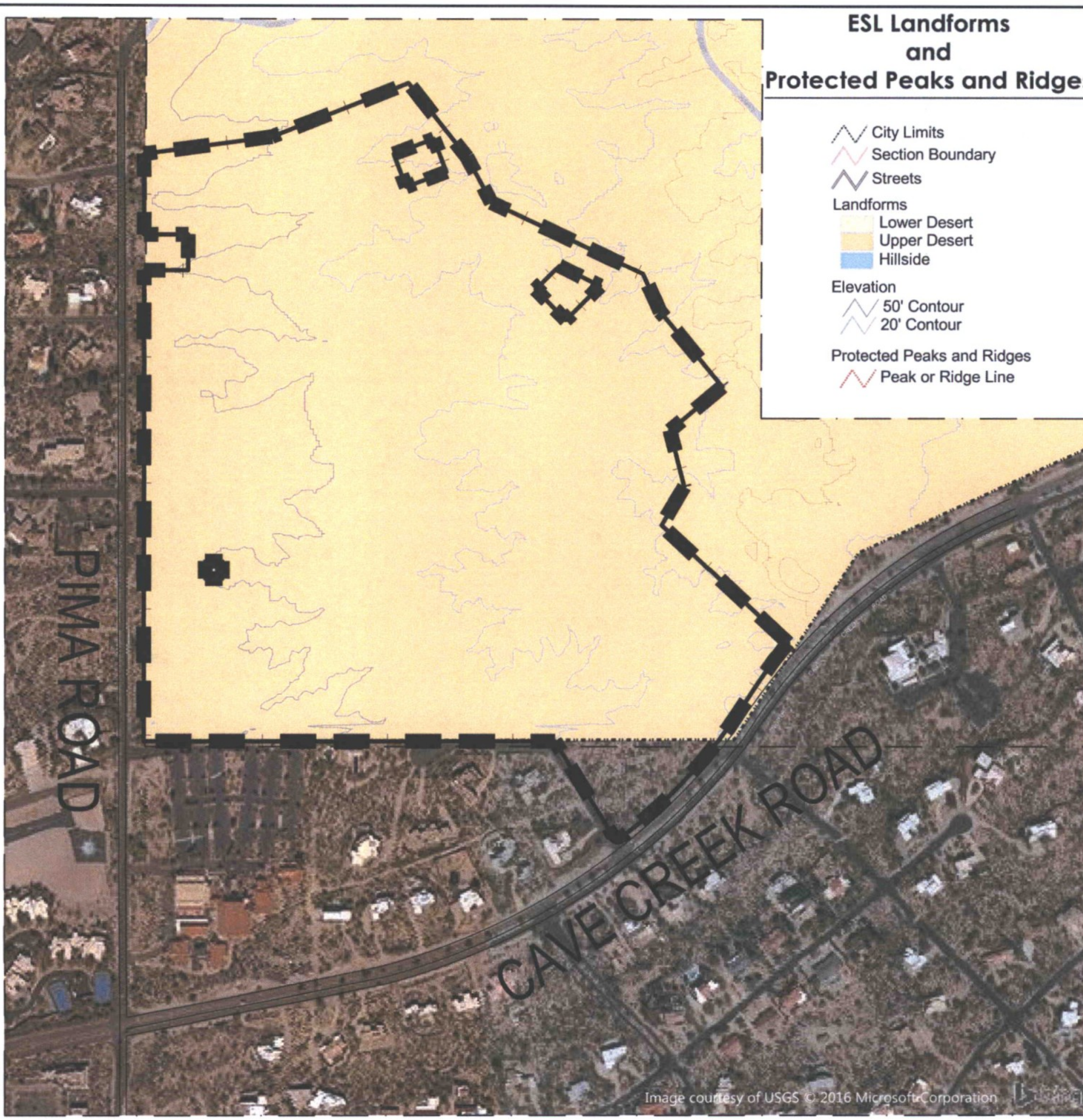
DESERT MOUNTAIN 19

EXHIBIT 1
VICINITY MAP

DATE: 06/15/2016	SCALE: N.T.S.	SHEET 1 OF 1
JOB NO.: 164434	DESIGN: RMH DRAWN: RMH	

EXHIBIT 2

ESL Classification Map



VICINITY MAP

N.T.S.

N

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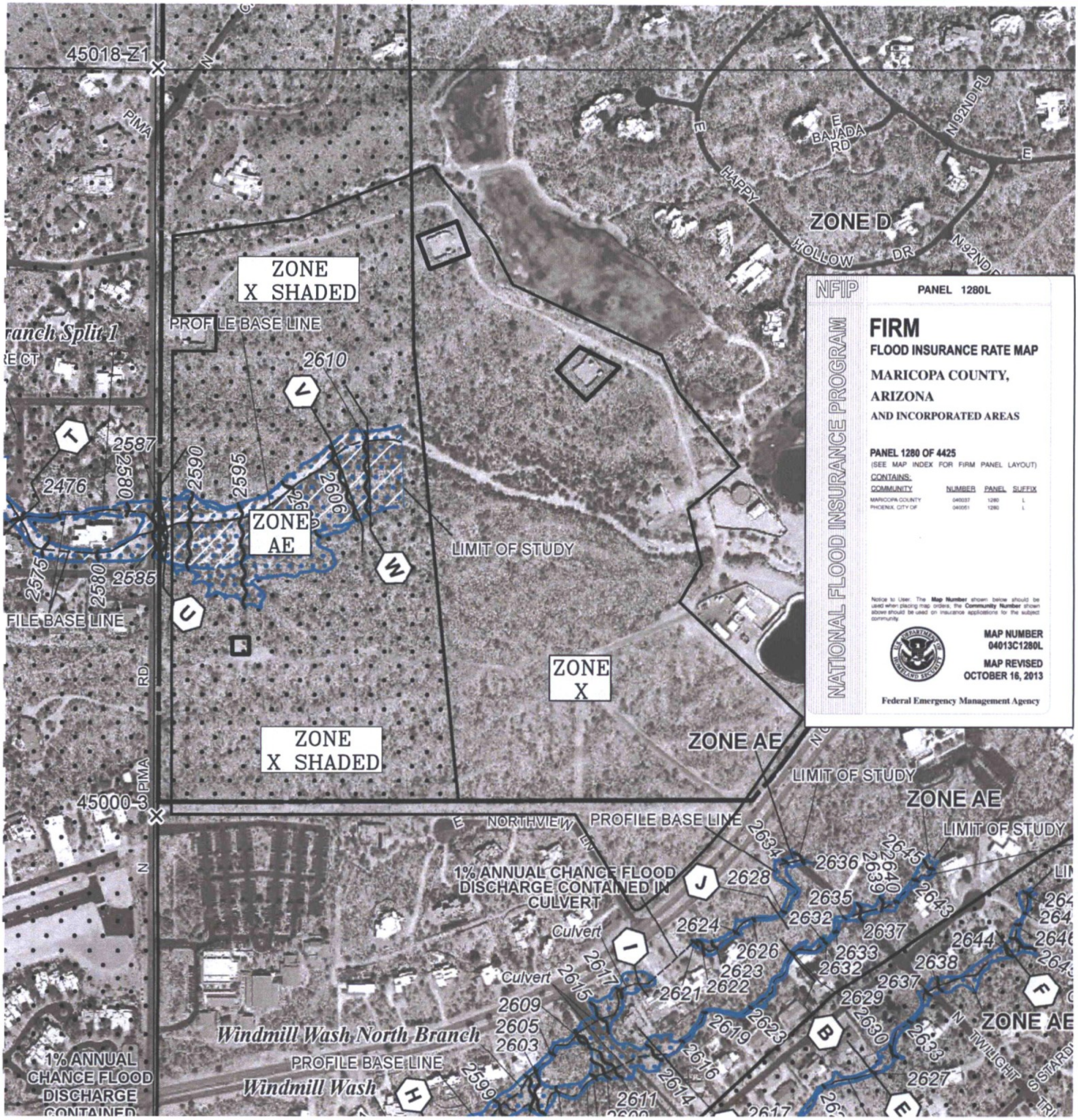
EXHIBIT 2
ESL Classification Map

DATE: 06/09/2016	SCALE: N.T.S.	SHEET 1 OF 1
JOB NO.: 164434	DESIGN: SES DRAWN: SES	

EXHIBIT 3

Flood Insurance Rate Map (FIRM)



N

0 250 500

Horz. 1 in. = 500 ft.

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EXHIBIT 3
FLOOD INSURANCE RATE MAP

DATE	SCALE		SHEET	
6/15/2016	1" = 500'		1 OF 1	
JOB NO.	DESIGN	RMH	CHECK	JCD
164434	DRAWN	RMH	RFI #	

N:\2016\164434\Project Support\Reports\Drainage\PDR\Exhibits\4434-Exhibit 3-FEMA FIRM Map.dwg

EXHIBIT 4

Soils Classification Map

N

LEGEND

(Soil 96)	NRCS MAP UNIT LEGEND
B4	SUB BASIN ID
(yellow line)	SOIL BOUNDARY
(red line)	SUB BASIN BOUNDARY

0 1200 2400

Horz. 1 in. = 1200 ft.

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CONSTRUCTION
OR RECORDING

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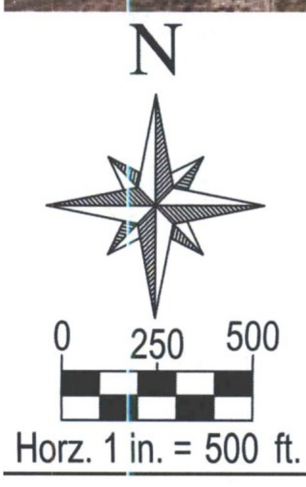
EXHIBIT 4
SOILS CLASSIFICATION MAP

DATE	SCALE	SHEET
06/09/2016	1" = 1200'	1 OF 1

EXHIBIT 5

Aerial Map



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DESERT MOUNTAIN 19		
EXHIBIT 5 AERIAL MAP		
DATE: 06/15/2016	SCALE: 1" = 500'	SHEET 1 OF 1
JOB NO.: 164434	DESIGN: RMH DRAWN: RMH	

EXHIBIT 6

Developed Conditions Land Use Map

0 250 500

Horz. 1 in. = 250 ft.

N

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DESERT MOUNTAIN 19

EXHIBIT 6
POST DEVELOPMENT LAND US
MAP

DATE 6/15/2016	SCALE 1" = 500'	SHEET 1 OF 1
JOB NO. 164434	DESIGN SES DRAWN SES	CHECK JCD RFI #

EXHIBIT 7

Existing Conditions Sub-Basin HEC-1 Map

LEGEND

K1	SUB-BASIN
R-CPE4	CHANNEL ROUTING
DET OD	STORAGE ROUTING
CP E5	HYDROGRAPH COMBINING
DV B7	FLOW DIVERSION
—	DRAINAGE AREA BOUNDARY

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DESERT MOUNTAIN 19

EXHIBIT 7
EXISTING CONDITIONS
SUB-BASIN HEC-1 MAP

DATE: 06-16-2016	SCALE: VARIES	SHEET 1 OF 1
JOB NO.: 164434	DESIGN: SES	
	DRAWN: SES	

LEGEND

C1	SUB-BASIN
R-CPE4	CHANNEL ROUTING
DET OD	STORAGE ROUTING
CP E5	HYDROGRAPH COMBINING
DV B7	FLOW DIVERSION
(line)	DRAINAGE AREA BOUNDARY

N

0 500 1000

Horz. 1 in. = 500 ft.

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DESERT MOUNTAIN 19

EXHIBIT 8
DEVELOPED CONDITIONS
SUB-BASIN HEC-1 MAP

DATE:	SCALE:	SHEET
06-16-2016	1" = 250'	1 OF 1
JOB NO.:	DESIGN: SES	
164434	DRAWN: SES	

N

0 150 300

Horz. 1 in. = 150 ft.

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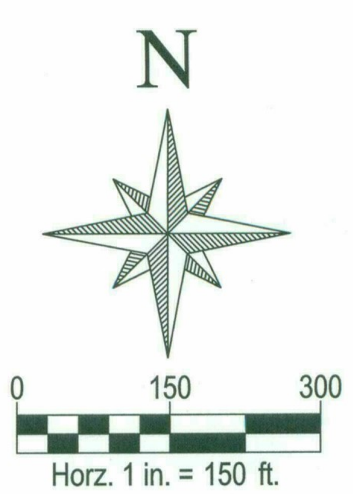
DESERT MOUNTAIN 19

EXHIBIT 9

EXISTING CONDITIONS

HYDRAULICS MAP

DATE: 06-16-2016	SCALE: 1" = 150	SHEET 1 OF 1
JOB NO.: 164434	DESIGN: SES DRAWN: SES	



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DATE:	SCALE:	SHEET
06-16-2016	1" = 150'	1 OF 1
JOB NO.:	DESIGN: JCD	
164434	DRAWN: JCD	

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DESERT MOUNTAIN PARCEL 19

PRELIMINARY GRADING PLAN

DATE	SCALE	SHEET
6/16/16	1" = 80'	1 OF 1
JOB NO.	DESIGN DC	CHECK DC
164434	DRAWN CD	RFI #

EXHIBIT 8

Developed Conditions Sub-Basin HEC-1 Map

EXHIBIT 9

Existing Conditions Hydraulics Map

EXHIBIT 10

Developed Conditions Hydraulics Map

EXHIBIT 11

Preliminary Grading Plan


contents DESERT MOUNTAIN
PARCEL 19
Appendix E - Digital Files
date 6-16-2016
WARNING: These electronic files are non-certified recordings of printed documents prepared by Wood, Patel & Associates, Inc. (Wood/Patel) and are provided only for the convenience of the receiving party and are intended solely for their exclusive use for the purposes expressly authorized. In accordance with standard industry practice, only printed documents conveyed directly by Wood/Patel may be relied upon. Wood/Patel is not responsible for deterioration or damage to file contents stored herein and use of the information obtained or derived from these electronic files will be at the receiver's sole risk. Please check this disk for virus contamination prior to use.
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