PRELIMINARY DRAINAGE REPORT

STORYROCK PHASE 2

SEPTEMBER 2017

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Contents

Figures

INTRODUCTION

PROJECT DESCRIPTION

This Preliminary Drainage report has been prepared for the proposed Storyrock Phase 2 residential development. StoryRock Phase 2 (Phase 2) is part of the StoryRock Master Planned Community (formerly named Cavalliere Ranch), a development consisting of 462-acres of single family residential construction. A Conceptual Master Drainage report was approved October 2014 with the project Zoning Case (13-ZN-2014).

StoryRock Phase 2 is a proposed 77-acre single family residential subdivision consisting of 78 single family residential units. Phase 2 is zoned for R1-18, R1-35, and R1-43 development. All R1-18 areas are proposed to be mass-graded and R1-35, R1-43, and R1-70 areas will require separate single lot grading plans for each lot developed. The proposed site is located within the City of Scottsdale and falls under the City's Environmentally Sensitive Lands Ordinance (ESLO).

PROJECT LOCATION AND DESCRIPTION

StoryRock is located within Section 12 of Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The site is bound to the north by the Happy Valley Road Alignment and to the west by 128th Street. The Pinnacle Peak Road Alignment borders the site to the south. The McDowell Sonoran Preserve borders the site to the east and portions of the site to the north and south. Phase 2 is located in the western half of the site, spanning Alameda Road. (See **Figure 1: Location Map**).

The development is located within one flood zone as shown on Flood Insurance Rate Map (FIRM) panel number 04013C1335L, dated October 16, 2013 (see **Appendix A** for FIRM). The flood zones that pertain to the site are as follows:

"Other Areas" Zone D – "Areas in which flood hazards are undetermined, but possible"

The property is undeveloped natural desert, characterized by braided washes and rock features of varying sizes. Undeveloped desert is also characterized by native desert grasses and brush.

SCOPE OF DRAINAGE REPORT

The approved master drainage report and associated zoning material established the general drainage parameter and criteria for site planning. This report for Phase 2 further establishes drainage parameters and criteria for preliminary design. This report establishes a hydrologic plan for the development of the site as well as preliminary hydraulic analysis for the washes crossing the site.

All drainage criteria presented in this report will conform to the City of Scottsdale Design Standards & Polices Manual (DS&PM).

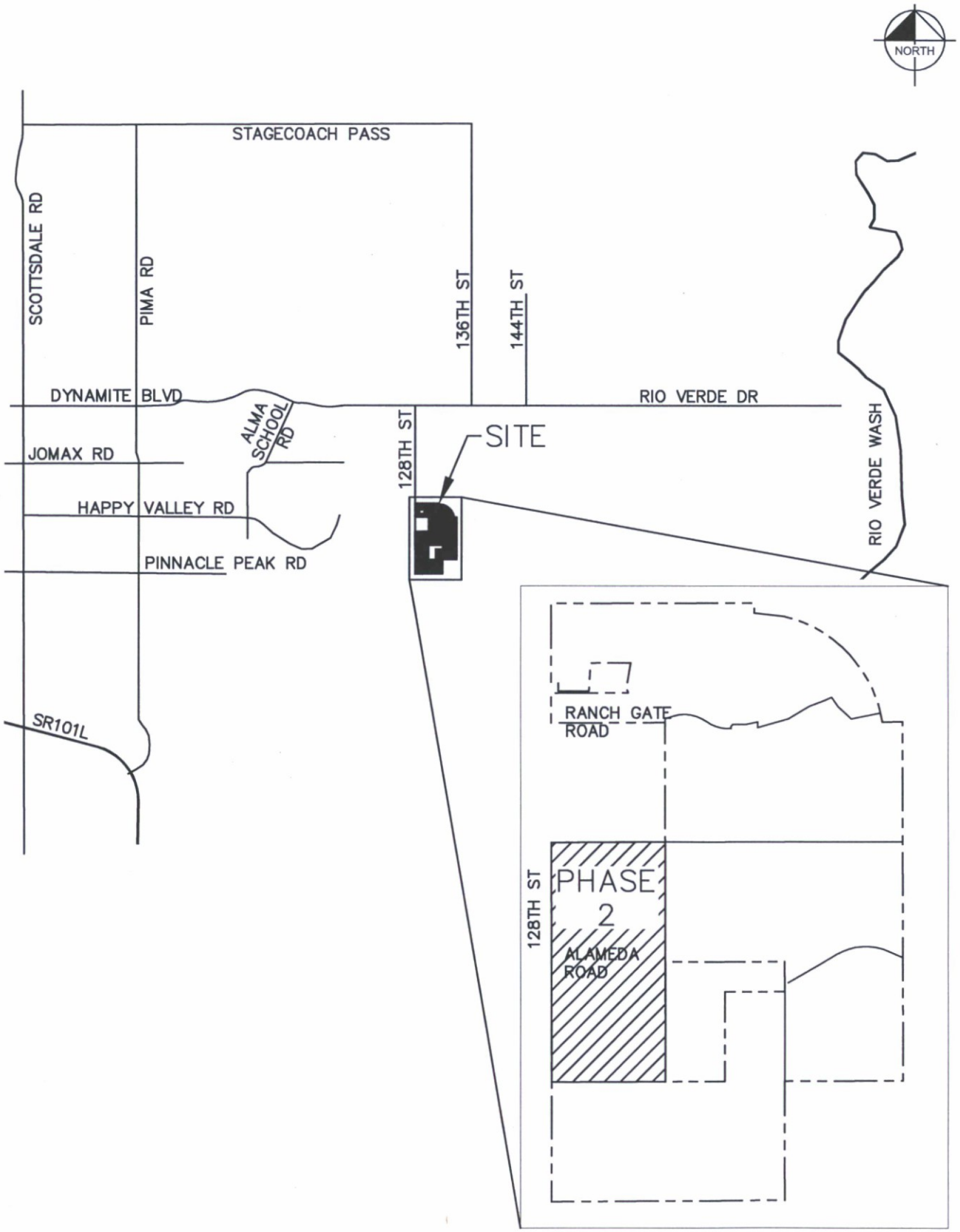


FIGURE 1
VICINITY MAP
STORYROCK

Kimley»Horn

DESCRIPTION OF EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

EXISTING SITE CONDITIONS

The site is characterized by many washes and rock features of varying sizes. The on-site washes vary in size and depth, but generally flow from the southwest to northeast or east through the site. Phase 2 is located in the western portion of the Storyrock development. Phase 2 is bound by other phases of Storyrock to the south and east, an undeveloped residential property to the north, and 128th Street to the west. Storm water runoff impacts Phase 2 from the west and south, and is conveyed through the site in existing washes. Runoff is discharged into the adjacent Storyrock Phase and undeveloped residential parcel to the east and north. Multiple ridgelines run though the site, in the general direction of southwest to northeast.

The site falls within the City of Scottsdale Environmentally Sensitive Lands (ESL) and is subject to the design criteria of the Environmentally Sensitive Lands Ordinance (ELSO). Specifically, the site is categorized as Upper Desert Landform of ESL. Per the DS&PM "The ordinance requires that a percentage of each property be permanently preserved as natural area open space (NAOS) and the specific environmental features, including vegetation, washes, mountain ridges and peaks be protected for inappropriate development".

EXISTING OFF-SITE DRAINAGE CONDITIONS

Off-site flows impact the site from the south, and west. Off-site flows originate from large undeveloped sub-basins. The basins to the south are part of the McDowell Sonoran Preserve. The areas to the west of 128th Street are mostly undeveloped residential properties. Refer to **Figure 2: Offsite Drainage Map.**

Off-site flows vary from local low flows up to large wash flows over 250 cfs. Most off-site flows will be conveyed through the site by the existing washes. 128th Street from Ranch Gate Road south to the Tom's Thumb trailhead consists of a two-lane paved road with several at-grade drainage crossings. A few locations provide low flow pipe culvert crossings that are undersized to accommodate larger storm events from overtopping the roadway section. No curb exists along the roadway and runoff generated along 128th Street sheet flows in the eastwardly direction through the StoryRock development.

An existing conditions hydrologic model was completed to develop peak discharges for the offsite runoff contributing to the Site. Offsite sub-basins were delineated based on the City of Scottsdale Quarter Section Topography. Significant washes are defined as having a 100-year flow of 50 cfs or more. There are no washes with 100-year peak flows of 750 cfs or greater, which indicates that no Vista Corridors exist within the project area. Significant washes been identified on **Figure 3: Existing Drainage Condition.** Hydrologic results can be found in **Appendix B**.

EXISTING ON-SITE DRAINAGE CONDITIONS

Five significant offsite washes cross Phase 2 and have been identified **Figure 3: Existing Drainage Condition**.

An existing conditions hydrologic model was completed to determine the peak stormwater discharges leaving the site. The existing condition discharges will be compared to the proposed condition discharges

in a "pre-vs-post" analysis. The proposed condition discharges must be equal to or below the existing condition.

An existing conditions hydraulic model was completed for the five significant washes crossing the site. The existing conditions hydraulic analysis was used as the basis for a post-conditions analysis. Hydraulic analysis has been performed on the significant washes to determine the 100-year Base Flood Elevations (BFEs) at specific cross sections. These elevations are used to map the existing 100 year limits of inundation.

Hydrology and hydraulic results can be found in **Appendix B** and **Appendix C** respectively.

PROPOSED PRELIMINARY DRAINAGE PLAN

PROPOSED ON-SITE DRAINAGE PLAN

The proposed Phase 2 development consists of 78 single family residential units. Lots located along the washes will have finished floor elevations a minimum of one foot above the 100-year base flood elevation (BFE). In general, lots will drain to the street system and runoff will be conveyed in the streets and/or in on-site swales and storm drain systems to detention basins or wash crossing locations located throughout the project. Due to the steep and undulating terrain, some lots will require rear or side yard drainage into adjacent washes or drainage swales within the development in order to minimize impacts to environmental features, existing natural area open space, and meet design criteria as required with the Environmentally Sensitive Lands Ordinance for the project. Specific lots that drain via rear or side yard locations within the project have been identified on **Figure 4** and on the preliminary grading and drainage plan in **Appendix E**. Detention basins will detain runoff before discharging into the existing washes and will be sized to meet first flush criteria. Specific areas that discharge into existing washes and are not routed through drainage basins will provide for alternative methods to meet first flush criteria. A further discussion regarding alternative methods to first flush is provided in the "Stormwater Storage Method" section below. The post development flows exiting the site will be attenuated though detention basins to a level equal to or less than pre-development flows. See **Figure 4: Proposed Conditions Drainage Map.**

Lots that are zoned R1-18 will be mass graded with the roadway improvements as part of this project. All other lots zoned as R1-35, and R1-43 will require single lot grading plans in the future for separate review and permit. The roadways and drainage facilities will be graded as part of this project to account for existing undisturbed areas located within future lot locations. Limits of grading have been shown on the preliminary grading and drainage plan in **Appendix E**.

PROPOSED OFF-SITE DRAINAGE PLAN

Offsite flows impact the site from the south, and west. Flows will be conveyed through the site and will discharge at their historic locations on the east and north side of the Site. In most cases, off-site flows are conveyed within the existing washes.

Associated with the development of Storyrock, 128th Street and Alameda Road roadway infrastructure will be constructed. These roadway improvements will be completed under a separate plan from the on-site improvements, and will include final drainage reports, however, the run-off from the off-site roadways is included within the on-site drainage plans.

128th Street consists of a median divided roadway with curb, and will include multiple culvert crossings to convey flow under the proposed roadway. Alameda Road and a crowned two lane road with curb with portions of median.

The proposed 128th Street Road improvements includes multiple culvert crossings to convey off-site flow under the proposed roadway. In the existing condition, 128tth Street roadway flows sheet flow to the east. The proposed 128th Street roadway design consolidates the roadway discharges locations to major wash crossings. Almeda Roadway discharges roadway runoff into the adjacent wash at proposed locations.

Any increased run-off created by the 128th Street roadway improvements. from either the increased imperious area or changes to the drainage patterns are accounted for with the Phase 2 drainage plans. It should be noted that the northern portions of 128th Street are included within the Storyrock Phase 1A drainage plan. Runoff from the eastern portion of Alameda Road, is accounted for in the Phase 1C drainage plan. Runoff from the western portion of Alameda, which impacts Phase 2, is accounted for in the Phase 2 drainage Plan. The pre-vs post analysis for Phase 2 includes the Alameda proposed sub basins and land uses.

All the significant washes are maintained within their existing wash corridors. A small portion of Wash214 will be modified to avoid the driveway of Lot 58. In both cases, the wash modification will provide a continuous natural wash corridor. Of the approximate 5,000 feet of significant washes within Phase 2, it is proposed to modify less than 300 feet. For extents of the wash modifications see **Figure 4: Proposed Conditions Drainage Map.**

PROPOSED ON-SITE HYDROLOGY

On-site runoff from the proposed development maintains post-development flows at or below pre-development conditions at each of the Phase 2 exit points, for the three design storms (2-year, 10-year, and 100-year). Except for four locations, CP11, CP13, CP14, and CP16 in which the post development flow exceeds the existing condition flow by approximately 1-2 cfs. This is within the level of accuracy of the analysis, and should be considered incidental and in conformance with the design. This increase does not negatively impact the downstream properties. For a summary of pre- and post-development peak discharges is provided in **Table 1.** Multiple detention basins are used to attenuate peak discharge from on-site runoff. A basin summary table has been provided in **Appendix B** indicating basin volumes, maximum depths, orifice sizes, side slopes, peak inflow and outflow rates, drain times, and storage volumes provided for the 2, 10, and 100 year events. Each basin utilizes a bleed-off pipe with orifice plate with the intent to control post-development runoff exiting the development, with a spillway for larger storm events. The total drain time for all basins is less than 36 hours. Detention Basin 125 (DB125) is an in-line basin and takes advantage of the natural detention and attenuation created by a roadway culvert crossing which allows for minimal disturbance to NAOS in the area. This specific in-line basin experiences depths greater than 3 feet for a very short period during the peak of larger storm events. DB20 provides a drain time of less than 5 minutes which helps minimize safety concerns in this location. Furthermore, the basin is located within the private community, setback from pedestrian walkways and a safety rail will be provided at the inlet headwall of the culvert. For in-line basins, the potential for culvert sedimentation build-up is increased. Sedimentation deposit within the culvert should be minimized, however, due to the high flow velocities within the culvert. Additionally, a culvert maintenance program is proposed with the development (see additional information in the "Culvert Sedimentation" section below). Refer to **Appendix B** for the detailed hydrologic model results.

Table 1: Peak Discharge Summary

Concentration Point	Prop. Cond. 2-Year (cfs)	Ex. Cond. 2-Year (cfs)	Prop. Cond. 10-Year (cfs)	Ex. Cond. 10-Year (cfs)	Prop. Cond. 100-Year (cfs)	Ex. Cond. 100-Year (cfs)
CP1	8	9	24	26	59	63
CP2	0	1	1	3	2	6
CP3	1	2	3	5	6	9
CP4	12	12	35	36	88	89
CP5	3	3	7	9	17	22

Concentration Point	Prop. Cond. 2-Year (cfs)	Ex. Cond. 2-Year (cfs)	Prop. Cond. 10-Year (cfs)	Ex. Cond. 10-Year (cfs)	Prop. Cond. 100-Year (cfs)	Ex. Cond. 100-Year (cfs)
CP6	17	17	48	49	120	122
CP7	8	8	23	24	56	58
CP8	3	4	8	11	18	24
CP9	2	2	6	6	12	12
CP10	36	36	106	108	267	270
CP11	11	10	29	28	70	69
CP12	0	0	1	1	1	2
CP13	7	6	14	17	29	40
CP14	3	3	9	8	20	20
CP15	2	2	3	7	11	15
CP16	18	17	50	52	126	130
CP17	3	3	5	9	11	23
CP18	2	2	4	7	15	16
CP19	32	32	90	93	225	233
CP20	1	1	2	2	3	5
CP21	38	38	111	113	277	283

PROPOSED ON-SITE HYDRAULICS

On-site runoff will be conveyed in the local streets, swales, storm drains, and culverts to the detention basins or wash discharge locations. Per the DS&PM, all interior streets will be designed to convey the peak discharge from the 10-year storm event at or below the top of curb elevation. Additionally, the streets will convey the 100-year runoff within the proposed tracts and maintain a maximum flow depth of eight inches above the gutter flow line. Catch basins with storm drains or scuppers will capture pavement runoff and outfall to the proposed detention basins. In specific roadway discharge locations areas where detention basins are not provided, alternative methods such as stormceptor structures will be provided to meet first flush criteria (see additional information in the "Stormwater Storage Method" section below). The scupper, catch basins and storm drains will be designed per the DS&PM and FCDMC's Drainage Policies and Standards. Detailed catch basin and street capacity analysis will be completed as part of the final design.

The existing hydraulic model was revised for a proposed hydraulic model to determine the proposed condition 100-year BFE and limits of inundation. Development of the site, including roadway, culverts and lots encroach into the existing BFE. The proposed hydraulic model includes these encroachments and modifications to calculate the proposed BFEs and proposed 100-year limits of inundations. The proposed BFEs at the boundary of the site, both upstream and downstream cannot be higher than the existing condition. **Table 2** provides a summary of the existing and proposed 100-year BFE at the boundary conditions of the site. Refer to **Appendix C** for complete hydraulic results.

Table 2: Boundary Base Flood Elevation Summary

Wash	HEC-RAS Cross Sections	Ex. Cond BFE	Prop. Cond BFE	Note:
Wash 80	3239	2662.37	2662.39	Site Entrance
Wash 80	2743	2649.17	2649.04	Site Exit
Wash 85	3694	2691.12	2691.26	Site Entrance
Wash 85	2263	2646.39	2646.39	Site Exit (Phase Boundary)
Wash 213	916	2715.75	2715.76	Site Entrance
Wash 214	1244	2725.58	2725.68	Site Entrance
Wash 215	3245	2665.66	2665.64	Site Exit
Wash 305	1881	2690.86	2690.90	Site Entrance (Phase Boundary)

Wash	HEC-RAS Cross Sections	Ex. Cond BFE	Prop. Cond BFE	Note:
Wash 305	1661	2680.20	2680.13	Site Exit

Roadway culvert crossings of significant washes were designed. The proposed culverts are designed to pass at least the 10-year flow without overtopping. The culverts will pass the 100-year flow with a maximum overtopping of 12-inches. Culverts will include design measures to protect the roadway from erosion during overtopping events. All lots and structures will be accessible by at least one route with a depth of flow no greater than 1 foot during the 100-year event. The proposed culverts are included in the hydraulic analysis, Refer to **Appendix C** for hydraulic results.

Minor flows less than 50 cfs impact lots, driveways, and roadways within the development. These flows will be routed around the lots in swales, and under driveways and roadways in culverts. The flows will discharge at their historic location onsite. The swales will be designed to be natural in appearance and match the existing topography of the site. For areas that will require future R1-35, R1,43, and R1-70 single lot grading plans, flows will be routed around and match existing drainage discharge locations. A typical lot grading detail has been provided on the preliminary grading and drainage plan in **Appendix E** for reference.

Per section 4-1.407 of the DS&PM development within ESL should minimize the modification of significant washes and maintain these washes in their native locations and conditions. All significant washes within Phase 2 are maintained in their existing corridors. See **Appendix E** for a copy of the preliminary grading plan. The preliminary grading plan shows the HEC-RAS cross sections and BFEs for the proposed conditions. The plan also includes information on the proposed detentions basins, fished floor elevations and culvert sizes.

LOWEST FINISH FLOORS

The finished floor elevations for each lot will have a minimum elevation of one foot above the 100-year base flood elevation (BFE). See **Appendix C** for complete hydraulic results and **Appendix E** for a copy of the preliminary grading plan with BFEs and pad elevations.

SPECIAL CONDITIONS

404 PERMIT/JURISDICTIONAL WASHES

Kimley-Horn has submitted and received approval of Jurisdictional Delineation (JD) for the entire Storyrock development from U.S. Army Corps of Engineers (Corp). Kimley-Horn will also prepare and process an Individual Permit for proposed disturbances.

EROSION SETBACK ANALYSIS

A Level I erosion setback analysis was performed on the significant washes on the site. The analysis followed the requirement in the Arizona Department of Water Resources (ADWR) Sate Standard Attachment 5-96. Locations along the washes, where roadways or lot wall encroaches into the erosion setback, a form of erosion protection is required. . A summary of the erosion setbacks for the significant washes is provided in **Table 3**. The erosion hazard setback and preliminary erosion protection is shown on

the preliminary grading plan, see **Appendix E**, for reference. The erosion cutoff walls or other form of erosion protection will be designed during the final design.

Setback = Sqrt(Q100) for straight wash sections, with a minimum setback of 20'

Setback = 2.5*Sqrt(Q100) for curved wash sections, with a minimum setback of 50'

Table 3 Erosion Setback Summary

	Q100 (cfs)	Erosion Hazard Setback, Straight Reach (Calculated)	Erosion Hazard Setback, Straight Reach (Design)	Erosion Hazard Setback, Curved Reach (Calculated)	Erosion Hazard Setback, Curved Reach (Design)
Wash 80	124	11'	20'	28'	50'
Wash 85	130	12'	20'	29'	50'
Wash 213	122	11'	20'	28'	50'
Wash 214	179	14'	20'	34'	50'
Wash 215	245	16'	20'	39'	50
Wash 305	294	17'	20'	43'	50'

ADEQ WATER QUALITY REQUIEMENTS

Development of the project will impact a large enough area to require a submittal of a Notice of Intent (NOI) to the Arizona Department of Environmental Quality (ADEQ). The NOI will be submitted to ADEQ and an approved NOI certificate with an AZCON number will be provided to the city before approval of any improvement plans.

CULVERT SEDIMENTATION

Sedimentation reduces the hydraulic performance of culverts and can lead to safety, erosion, and maintenance issues. The proposed culverts and storm drains within the project have been designed to minimize sedimentation when possible, as well as providing solutions to reduce the impact of sedimentation. Culverts are designed to match the slope of the existing channel. Additionally, the majority of the culverts are "inlet" control, with flow velocity greater than 10 ft/s. These "self-cleaning" velocities help clear the culverts of sedimentation in larger storm events.

Storm drains which receive natural channel flow are susceptible to sedimentation. Storm drains will be designed with sediment traps prior to the storm drain to capture sediment.

Sedimentation is inevitable given the natural condition of the existing washes traversing the property. To help alleviate the potential concerns that arise from sediment build-up in culverts and storm drains on the project, it is recommended that the HOA implement a culvert and storm drain maintenance program. The scheduled program will inspect and clean the culverts to limit sedimentation and ensure proper operation of the drainage facilities. The program will inspect all culverts and storm drains bi-annually, and after significant storm events.

DATA ANALYSIS METHODS

GENERAL DISCUSSION

A detailed hydrologic model was prepared for the existing and proposed site condition. A hydraulic model was prepared for the significant washes that traverse the site. The sections below provide the hydrology and hydraulic methodology.

HYDROLOGY

The U.S. Army Corps of Engineers HEC-1 hydrologic computer program was used to determine the 2-, 10-, and 100-year peak discharges for off-site and on-site flows. HEC-1 models were prepared for the existing and proposed development conditions. The Drainage Design Management System for Windows (DDMSW) program was used to develop the hydrologic parameters for the on-site drainage areas and off-site drainage areas east of the site. Green and Ampt rainfall loss parameters were estimated using DDMSW, the City of Scottsdale parameters, and the Flood Control District of Maricopa County (FCDMC) Drainage Design Manual – Hydrology (Hydrology Manual). Time of Concentration calculations were calculated using DDMSW. Values that show non-default values or out-of-range results are due to the NMIN parameter selected for the HEC-1 Model. Because of the varying sub-basin sizes, the selected NMIN parameter will not meet the time of concentration requirements specified in the FCDMC Drainage Design Manual - Hydrology for each sub-basin. The HEC-1 models were run with varying NMIN parameters to confirm that the hydrograph shape and peaks were valid. The HEC-1 models were prepared using the Clark Unit Hydrograph. Rainfall depth were estimated for the site from the National Oceanic and Atmospheric Administration Atlas 14 (NOAA14).

Two different soil types were identified for the on-site and off-site sub-basins using the web soil survey from the National Resource Conservation Service (NRCS). A list of the soils found in the watershed is shown below:

- Gran-Wickenburg complex, 1 to 10 percent slopes
- Gran-Wickenburg-Rock outcrop complex, 10 to 65 percent slopes

The majority of the site, with the exception of a small portion of a few offsite sub-basins, falls within the 1 to 10 percent range. A map showing the different soil types, which was developed as part of the approved master drainage report, along with web soil survey results is included within **Appendix B**.

Land use parameters for the HEC-1 models were determined for each of the project zoning types, roadway and natural desert. The initial abstraction (IA) and Vegetation cover parameters are based on matching land use types from Table 4.2 of the County Hydrology Manual. The RTIMP for each zoning case was calculated by taking a sample area of roadway and lots and determining the percent of hydraulically connected area. See **Table 4** below for complete Land Use Parameters. The sample areas and RTIMP calculations are included in **Appendix B**. Land use maps for the existing and proposed development conditions are provided in **Appendix B**.

Table 4 Land Use Parameters

Land Use Code	Description	IA	RTIMP	Vegetation Cover
R1-18	Min Lot Size = 13,500 Sq Ft	0.30	27	50.0
R1-35	Min Lot Size = 26,2500 Sq Ft	0.30	21	50.0
R1-43	Min Lot Size = 32,250 Sq Ft	0.30	17	20.0
Road	24' Roadway, 40' Tract/ROW	0.10	60	75.0
Natural Desert	Natural Desert	0.35	0	25.0

A stage storage and outfall rate calculation spreadsheet was prepared for the proposed detention basins. The state storage volume is based on end-area calculations at 1-foot intervals. The basin discharge rates through the proposed bleed pipes is calculated from Manning and Orifice equations. Overflow for larger storm events are provided in an overflow weir, which will be sized at final design.

HYDRAULICS

100-year BFEs for the significant washes were established using the U.S. Army Corps of Engineers HEC-RAS (v4.1.1) computer program. Cross sections were cut for the existing washes using the 1' flown aerial topography. The hydraulic models were run using mixed flow regime conditions with the normal depth boundary condition. Manning's 'n' coefficients for the channels was set at 0.035 and values for the overbanks are 0.050. Values were selected from Table 3-1 of the HEC-RAS Reference Manual. See **Appendix C** for Table 3-1. Based on field observations and aerial photography the washes are an undisturbed natural desert with an impervious weed barrier. One flow profile is used in the existing condition model representing the design flow. The proposed condition model uses two flow profiles. The first is a baseline of the design flow, the second is the same base design flow with the development encroachments included in the model.

Culvert crossing of the significant washes were sized using the Federal Highway Administration HY-8 version 7.30 computer program. Culverts were preliminary size to convey at least the 10-year storm through the structure, and convey the 100-year flow with a maximum roadway overtopping of 12-inches.

Refer to **Appendix C** for the results of the hydraulic modeling for the existing and proposed condition. See the attached CD for copy of the HEC-RAS report for the existing and proposed condition.

STORMWATER STORAGE METHOD

The existing property is a part of the ESLO. Based on new City ordinances, a waiver will need to be obtained for any volume less than the 100-year, 2-hour volume. However, there is no waiver fee associated with the volumes that do not result in an increase in downstream runoff. See **Appendix D** for a copy of the waiver. Refer to **Appendix B** for the pre- and post-development hydrologic model results.

Where detention basins are provided within the development to capture runoff generated on-site and discharged from roadway improvements, the basins have been sized to meet first flush storage

requirements (See First Flush Summary Table in **Appendix B**). In specific areas within the development, a detention basin is not feasible to meet the first flush criteria. As outlined in the City's Stormwater and Floodplain Management Ordinance, an alternative stormwater control can be provided if the development is located within the upper desert landform and runoff has no additional adverse impact on other properties. The locations where an alternative method is proposed are identified on the preliminary grading and drainage plan (**Appendix E**) and do not adversely impact any adjacent properties. In various areas, a rip-rap spillway and small dissipation basin is proposed as an alternative stormwater control. The rip-rap basins are proposed to be 1-foot deep and sized to reduce the velocity entering the basin for better capture of sedimentation and potential contaminants that may be present. The basin bottom was calculated using the rip-rap apron dimension requirements as outlined in the Drainage Design Manual for Maricopa County, Table 8.6. The spillways will be designed for a median rip-rap size (D50) of 6 inches to convey flow at 6-inch flow depth for the 2-year, 10-minute design storm. The higher frequency storm events are appropriate when evaluating water quality and represents the first-half inch of rainfall within the street network. Refer to **Appendix C** for the spillway and dissipation basin calculations.

There are other options for stormwater quality that could be considered for this project such as a Stormceptor system or other oil grit separators on the market. If a particular area on the project warrants this type of application in the future, specific stormwater control design measures will be provided for the City's review and approval during final design.

CONCLUSIONS

- Multiple significant washes cross the development. Proposed development will encroach on the washes. Hydraulic models for the existing and proposed conditions were prepared to determine the BFE. The BFE was used to set the finished floor elevations for each lot.

- Significant washes are maintained in their existing corridors whenever possible.

- Onsite runoff will be conveyed through the local streets and storm drains to the detention basins and wash corridors. Culverts will convey the flow under the new roads. The conveyance facilities will be sized during final design.

- Hydrologic models were prepared for the on-site and off-site areas for the pre- and post-development conditions. Onsite detention basins were sized to ensure that the post-development runoff exiting the site are equal or less than pre-development conditions. Basins are design to drain within 36 hours.

- A Level 1 Erosion Setback analysis was performed for each major wash corridor. Locations where the setback is located within future development will require an erosion protection. The erosion protection will be designed as part of the final design. The Erosion Setback is shown on the Preliminary Grading Plan.

- Where detention basins are provided within the development to capture runoff generated on-site and discharged from roadway improvements, the basins have been sized to meet first flush storage requirements (See First Flush Summary Table in Appendix **B**). In specific areas within the development, a detention basin is not feasible to meet the first flush criteria. As outlined in the City's Stormwater and Floodplain Management Ordinance, an alternative stormwater control can be provided if the development is located within the upper desert landform and runoff has no additional adverse impact on other properties. In various areas, a rip-rap spillway and small dissipation basin is proposed as an alternative stormwater control.

REFERENCES

City of Scottsdale, *Design Standards and Policies Manual,* January 2010.

City of Scottsdale, Stormwater and Floodplain Management Ordinance, Chapter 37, July 2016.

Federal Emergency Management Agency, Flood Insurance Rate Map Panel No04013C1331M, dated November 4, 2015

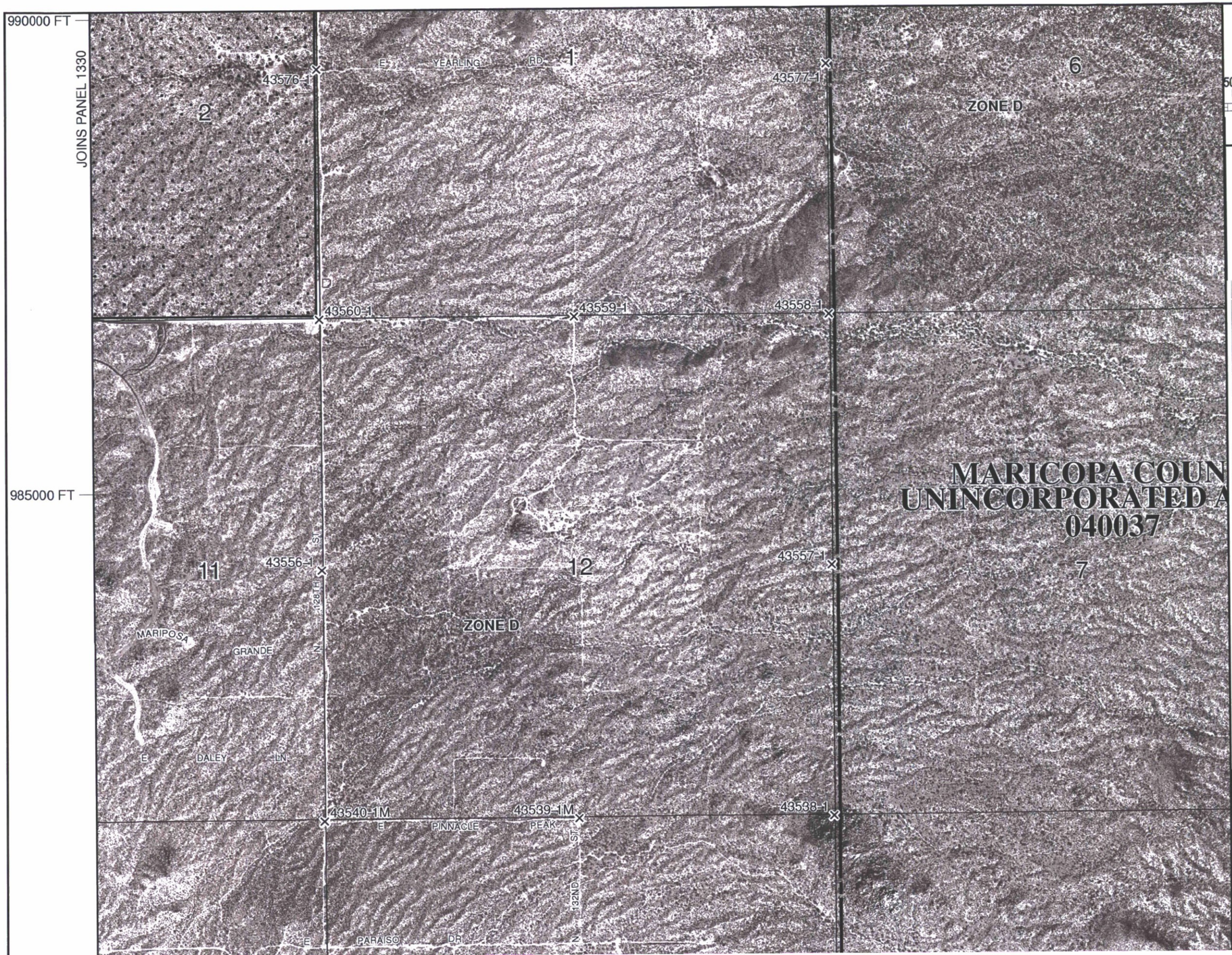
Flood Control District of Maricopa County, Drainage Design Manual – Hydrology, updated August 15, 2013.

U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS, River Analysis System Hydraulic Reference Manual Version 4.1, January 2010.

U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS, River Analysis System User's Manual Version 4.1, January 2010.

City of Scottsdale Topography Quarter Section Maps.

Appendix A – Flood Insurance Rate Map



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METE

PANEL 1335L

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA

AND INCORPORATED AREAS

PANEL 1335 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1335	L
SCOTTSDALE, CITY OF	045012	1335	L

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C1335L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
OFF100	645	61	64561	0.011	100.00	0.150	-	100	
OFF105	645	61	64561	0.085	100.00	0.150	-	100	
OFF110	645	61	64561	0.037	100.00	0.150	-	100	
OFF115	645	61	64561	0.007	100.00	0.150	-	100	
OFF120	645	61	64561	0.094	99.20	0.150	-	100	
	645	63	64563	0.001	0.80	0.140	25.00	100	
OFF125	645	61	64561	0.100	91.60	0.150	-	100	
	645	63	64563	0.009	8.40	0.140	25.00	100	
OFF80	645	61	64561	0.044	100.00	0.150	-	100	
OFF85	645	61	64561	0.002	100.00	0.150	-	100	
OFF90	645	61	64561	0.003	100.00	0.150	-	100	
OFF95	645	61	64561	0.064	100.00	0.150	-	100	
ON115	645	61	64561	0.004	100.00	0.150	-	100	
ON120	645	61	64561	0.001	100.00	0.150	-	100	
ON125	645	61	64561	0.017	100.00	0.150	-	100	
ON130	645	61	64561	0.012	100.00	0.150	-	100	
ON135	645	61	64561	0.008	100.00	0.150	-	100	
ON140	645	61	64561	0.017	100.00	0.150	-	100	
ON145	645	61	64561	0.014	100.00	0.150	-	100	
ON150	645	61	64561	0.007	100.00	0.150	-	100	
ON215	645	61	64561	0.030	100.00	0.150	-	100	
ON220	645	61	64561	0.003	100.00	0.150	-	100	
ON225	645	61	64561	0.005	100.00	0.150	-	100	
ON230	645	61	64561	0.007	100.00	0.150	-	100	
ON235	645	61	64561	0.002	100.00	0.150	-	100	
ON305	645	61	64561	0.021	100.00	0.150	-	100	

Kimley»Horn

Engineering, Planning and Environmental Consultants
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

NO.	REVISION	BY	DATE	APPR.

SCALE(H):1" = 1800'
SCALE(V): N/A
DESIGNED BY: MAW
DRAWN BY: PPP
CHECKED BY: MAW
DATE: AUGUST 2014

CAVALLIERE
EXISTING SOILS MAP

PROJECT NO.
191068013

DRAWING NAME
Existing_Soils.mxd

Flood Control District of Maricopa County
Drainage Design Management System
HEC-1 ROUTING DATA
Project Reference: STORYROCK PH2 EX

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
NORMAL DEPTH															
Major Basin 01															
RO115	0.050	0.035	0.050	540.00	0.0260	-	X:	-	12.00	18.00	18.50	19.00	27.00	29.00	34.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO125A	0.050	0.035	0.050	525.00	0.0400	-	X:	-	6.00	13.00	16.00	16.10	19.00	22.00	28.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO125B	0.050	0.035	0.050	525.00	0.0400	-	X:	-	6.00	13.00	16.00	16.10	19.00	22.00	28.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO125B	0.050	0.035	0.050	900.00	0.0400	-	X:	-	6.00	8.00	11.00	11.20	13.00	19.00	27.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO125C	0.050	0.035	0.050	720.00	0.0280	-	X:	-	8.00	14.00	19.00	19.10	26.00	29.00	34.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO140A	0.050	0.035	0.050	333.00	0.0270	-	X:	-	27.00	30.00	34.00	34.20	40.00	47.00	82.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO140B	0.050	0.035	0.050	626.00	0.0340	-	X:	-	7.00	8.00	11.00	11.20	14.00	16.00	31.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO140C	0.050	0.035	0.050	1,210.00	0.0320	-	X:	-	3.00	6.00	11.00	11.20	17.00	23.00	48.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO215A	0.050	0.035	0.050	975.00	0.0360	-	X:	-	9.00	21.00	25.00	32.00	36.00	70.00	90.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO215B	0.050	0.035	0.050	800.00	0.0340	-	X:	-	6.00	10.00	13.00	19.00	21.00	26.00	62.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO215C	0.050	0.035	0.050	445.00	0.0340	-	X:	-	12.00	28.00	36.00	48.00	71.00	73.00	76.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
RO215D	0.050	0.035	0.050	364.00	0.0300	-	X:	-	5.00	8.00	11.00	11.10	14.00	17.00	24.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO220	0.050	0.035	0.050	310.00	0.0420	-	X:	-	8.00	15.00	21.00	21.10	25.00	30.00	36.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO230A	0.050	0.035	0.050	770.00	0.0340	-	X:	-	10.00	20.00	35.00	51.00	61.00	68.00	73.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO230B	0.050	0.035	0.050	270.00	0.0480	-	X:	-	9.00	30.00	45.00	118.00	122.00	127.00	132.00
							Y:	2.00	1.00	0.50	-	-	1.00	2.00	3.00
RO305A	0.050	0.035	0.050	685.00	0.0480	-	X:	-	10.00	21.00	30.00	43.00	61.00	68.00	75.00
							Y:	3.00	2.00	1.00	-	-	1.00	-	1.00
RO305B	0.050	0.035	0.050	970.00	0.0480	-	X:	-	6.00	8.00	20.00	32.00	43.00	51.00	66.00
							Y:	3.00	2.00	1.00	-	-	1.00	1.50	2.00
RO305C	0.050	0.035	0.050	653.00	0.0430	-	X:	-	10.00	15.00	26.00	43.00	155.00	165.00	169.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   27OCT16  TIME  17:37:46   *
*                                       *
*****************************************
```


```
*****************************************
*                                       *
*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*       609 SECOND STREET               *
*     DAVIS, CALIFORNIA 95616           *
*       (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


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

  1       ID       Flood Control District of Maricopa County
  2       ID       STORYROCK PH2 EX - STORYROCK PHASE 2 EXISTING CONDITION
  3       ID       2 YEAR
  4       ID       6 Hour  Storm
  5       ID       Unit Hydrograph: Clark
  6       ID       Storm: Multiple
  7       ID       10/27/2016
          *DIAGRAM
  8       IT     5  1JAN99      0    2000
  9       IO     5
 10       IN    15
          *
 11       JD  1.419  0.0001
 12       PC  0.000   0.008  0.016  0.025  0.033  0.041  0.050  0.058  0.066  0.074
 13       PC  0.087   0.099  0.118  0.138  0.216  0.377  0.834  0.911  0.931  0.950
 14       PC  0.962   0.972  0.983  0.991  1.000
 15       JD  1.410  0.5000
 16       PC  0.000   0.008  0.016  0.025  0.033  0.041  0.050  0.058  0.066  0.074
 17       PC  0.087   0.099  0.118  0.138  0.216  0.377  0.834  0.911  0.931  0.950
 18       PC  0.962   0.972  0.983  0.991  1.000
 19       JD  1.384     2.8
 20       PC  0.000   0.009  0.016  0.025  0.034  0.042  0.051  0.059  0.067  0.076
 21       PC  0.087   0.100  0.120  0.163  0.252  0.451  0.694  0.837  0.900  0.938
 22       PC  0.950   0.963  0.975  0.988  1.000
          *

 23       KK  OFF80   BASIN
 24       BA  0.044
 25       LG   0.35    0.40   6.00   0.18      0
 26       UC  0.503   0.672
 27       UA     0     3.0    5.0    8.0   12.0   20.0   43.0   75.0   90.0   96.0
 28       UA   100
          *

 29       KK  RO115   ROUTE
 30       RS     1    FLOW
 31       RC  0.050   0.035  0.050    540 0.0260   0.00
 32       RX   0.00   12.00  18.00  18.50  19.00  27.00  29.00  34.00
 33       RY   3.00    2.00   1.00   0.00   0.00   1.00   2.00   3.00
          *

 34       KK  ON115   BASIN
 35       BA  0.004
```

```
 38          UA      0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 39          UA    100
             *

 40          KK   CO115 COMBINE
 41          HC      2
             *
```



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

 42          KK   ON120   BASIN
 43          BA   0.001
 44          LG    0.35    0.40    6.00    0.18       0
 45          UC   0.207   0.480
 46          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 47          UA     100
             *

 48          KK   OFF85   BASIN
 49          BA   0.002
 50          LG    0.35    0.40    6.00    0.18       0
 51          UC   0.162   0.178
 52          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 53          UA     100
             *

 54          KK  RO125A   ROUTE
 55          RS       1    FLOW
 56          RC   0.050   0.035   0.050     525  0.0400    0.00
 57          RX    0.00    6.00   13.00   16.00   16.10   19.00   22.00   28.00
 58          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 59          KK   OFF90   BASIN
 60          BA   0.003
 61          LG    0.35    0.40    6.00    0.18       0
 62          UC   0.146   0.109
 63          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 64          UA     100
             *

 65          KK  RO125B   ROUTE
 66          RS       1    FLOW
 67          RC   0.050   0.035   0.050     525  0.0400    0.00
 68          RX    0.00    6.00   13.00   16.00   16.10   19.00   22.00   28.00
 69          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 70          KK  CO125A COMBINE
 71          HC      2
             *

 72          KK  RO125C   ROUTE
 73          RS       1    FLOW
 74          RC   0.050   0.035   0.050     720  0.0280    0.00
 75          RX    0.00    8.00   14.00   19.00   19.10   26.00   29.00   34.00
 76          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
```



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

 77          KK   ON125   BASIN
 78          BA   0.017
 79          LG    0.35    0.40    6.00    0.18       0
 80          UC   0.389   0.545
 81          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 82          UA     100
             *

 83          KK  CO125B COMBINE
 84          HC      2
             *

 85          KK   OFF95   BASIN
 86          BA   0.064
 87          LG    0.35    0.40    6.00    0.18       0
```

```
 90          UA     100
             *

 91          KK  RO140A   ROUTE
 92          RS       1    FLOW
 93          RC   0.050   0.035   0.050     333  0.0270    0.00
 94          RX    0.00   27.00   30.00   34.00   34.20   40.00   47.00   82.00
 95          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 96          KK  OFF100   BASIN
 97          BA   0.011
 98          LG    0.35    0.40    6.00    0.18       0
 99          UC   0.310   0.407
100          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
101          UA     100
             *

102          KK  RO140B   ROUTE
103          RS       1    FLOW
104          RC   0.050   0.035   0.050     626  0.0340    0.00
105          RX    0.00    7.00    8.00   11.00   11.20   14.00   16.00   31.00
106          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

107          KK  CO140A COMBINE
108          HC       2
             *

109          KK  RO140C   ROUTE
110          RS       1    FLOW
111          RC   0.050   0.035   0.050    1210  0.0320    0.00
112          RX    0.00    3.00    6.00   11.00   11.20   17.00   23.00   48.00
113          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
```



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

114          KK   ON140   BASIN
115          BA   0.017
116          LG    0.35    0.40    6.00    0.18       0
117          UC   0.408   0.616
118          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
119          UA     100
             *

120          KK  CO140B COMBINE
121          HC       2
             *

122          KK   ON130   BASIN
123          BA   0.012
124          LG    0.35    0.40    6.00    0.18       0
125          UC   0.347   0.543
126          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
127          UA     100
             *

128          KK   ON135   BASIN
129          BA   0.008
130          LG    0.35    0.40    6.00    0.18       0
131          UC   0.301   0.422
132          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
133          UA     100
             *

134          KK   ON145   BASIN
135          BA   0.014
136          LG    0.35    0.40    6.00    0.18       0
137          UC   0.377   0.575
138          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
139          UA     100
             *

140          KK   ON150   BASIN
141          BA   0.007
142          LG    0.35    0.40    6.00    0.18       0
143          UC   0.265   0.331
```

```
*
KK    CEX1 COMBINE
HC       6
*

KK  OFF105   BASIN
BA   0.085
LG    0.35    0.40    6.00    0.18       0
UC   0.538   0.678
UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
UA     100
*
```



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

KK  RO215A   ROUTE
RS       1    FLOW
RC   0.050   0.035   0.050     975  0.0360    0.00
RX    0.00    9.00   21.00   25.00   32.00   36.00   70.00   90.00
RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
*

KK  OFF110   BASIN
BA   0.037
LG    0.35    0.40    6.00    0.18       0
UC   0.428   0.595
UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
UA     100
*

KK  OFF115   BASIN
BA   0.007
LG    0.35    0.40    6.00    0.18       0
UC   0.227   0.236
UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
UA     100
*

KK   RO220   ROUTE
RS       1    FLOW
RC   0.050   0.035   0.050     310  0.0420    0.00
RX    0.00    8.00   15.00   21.00   21.10   25.00   30.00   36.00
RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
*

KK   ON220   BASIN
BA   0.003
LG    0.35    0.40    6.00    0.18       0
UC   0.222   0.326
UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
UA     100
*

KK   CO220 COMBINE
HC       2
*

KK  RO215D   ROUTE
RS       1    FLOW
RC   0.050   0.035   0.050     364  0.0300    0.00
RX    0.00    5.00    8.00   11.00   11.10   14.00   17.00   24.00
RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
*
```



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

KK  CO215A COMBINE
HC       2
*

KK  RO215B   ROUTE
RS       1    FLOW
RC   0.050   0.035   0.050     800  0.0340    0.00
RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
```

```
196          KK  CO215B COMBINE
197          HC       2
             *

198          KK  RO215C   ROUTE
199          RS       1    FLOW
200          RC   0.050   0.035   0.050     445  0.0340    0.00
201          RX    0.00   12.00   28.00   36.00   48.00   71.00   73.00   76.00
202          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

203          KK   ON215   BASIN
204          BA   0.030
205          LG    0.35    0.40    6.00    0.18       0
206          UC   0.349   0.341
207          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
208          UA     100
             *

209          KK  CO215C COMBINE
210          HC       2
             *

211          KK   ON235   BASIN
212          BA   0.002
213          LG    0.35    0.40    6.00    0.18       0
214          UC   0.176   0.222
215          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
216          UA     100
             *

217          KK  OFF120   BASIN
218          BA   0.095
219          LG    0.35    0.40    6.00    0.18       0
220          UC   0.566   0.825
221          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
222          UA     100
             *
```



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

223          KK  RO305A   ROUTE
224          RS       1    FLOW
225          RC   0.050   0.035   0.050     685  0.0480    0.00
226          RX    0.00   10.00   21.00   30.00   43.00   61.00   68.00   75.00
227          RY    3.00    2.00    1.00    0.00    0.00    1.00    0.00    1.00
             *

228          KK  OFF125   BASIN
229          BA   0.109
230          LG    0.35    0.40    6.00    0.18       2
231          UC   0.594   0.883
232          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
233          UA     100
             *

234          KK  RO305B   ROUTE
235          RS       1    FLOW
236          RC   0.050   0.035   0.050     970  0.0480    0.00
237          RX    0.00    6.00    8.00   20.00   32.00   43.00   51.00   66.00
238          RY    3.00    2.00    1.00    0.00    0.00    1.00    1.50    2.00
             *

239          KK  CO305A COMBINE
240          HC       2
             *

241          KK  RO305C   ROUTE
242          RS       1    FLOW
243          RC   0.050   0.035   0.050     653  0.0430    0.00
244          RX    0.00   10.00   15.00   26.00   43.00  155.00  165.00  169.00
245          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

246          KK   ON305   BASIN
247          BA   0.021
248          LG    0.35    0.40    6.00    0.18       0
249          UC   0.356   0.437
```

```
          252          KK  CO305B COMBINE
          253          HC       2
                       *

          254          KK  RO230B   ROUTE
          255          RS       1   FLOW
          256          RC   0.050   0.035   0.050     270  0.0480    0.00
          257          RX    0.00    9.00   30.00   45.00  118.00  122.00  127.00  132.00
          258          RY    2.00    1.00    0.50    0.00    0.00    1.00    2.00    3.00
                       *
1                                          HEC-1 INPUT                                  PAGE  8

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

          259          KK   ON225   BASIN
          260          BA   0.005
          261          LG    0.35    0.40    6.00    0.18       0
          262          UC   0.223   0.263
          263          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          264          UA     100
                       *

          265          KK  RO230A   ROUTE
          266          RS       1   FLOW
          267          RC   0.050   0.035   0.050     770  0.0340    0.00
          268          RX    0.00   10.00   20.00   35.00   51.00   61.00   68.00   73.00
          269          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                       *

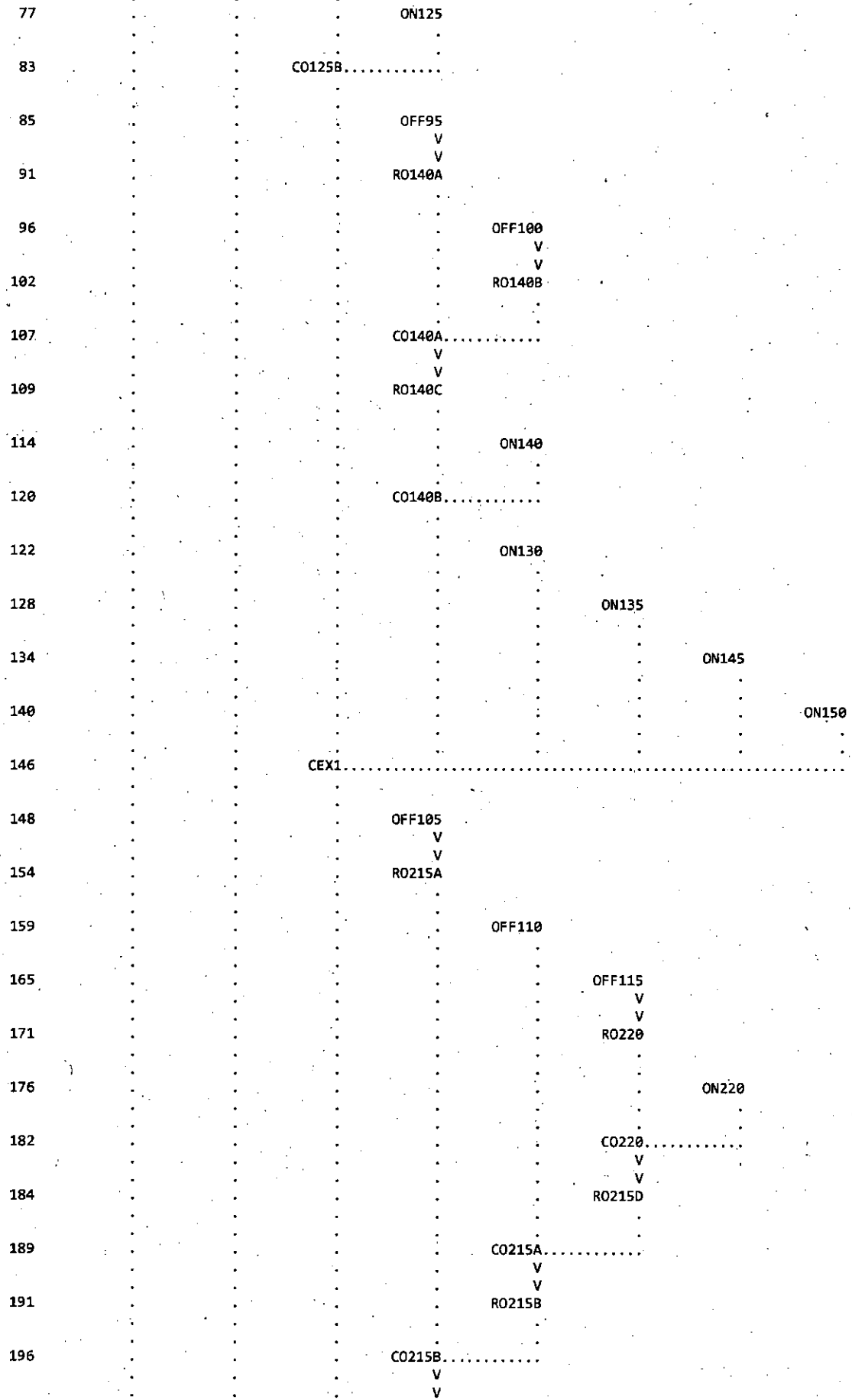
          270          KK   ON230   BASIN
          271          BA   0.007
          272          LG    0.35    0.40    6.00    0.18       0
          273          UC   0.277   0.348
          274          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          275          UA     100
                       *

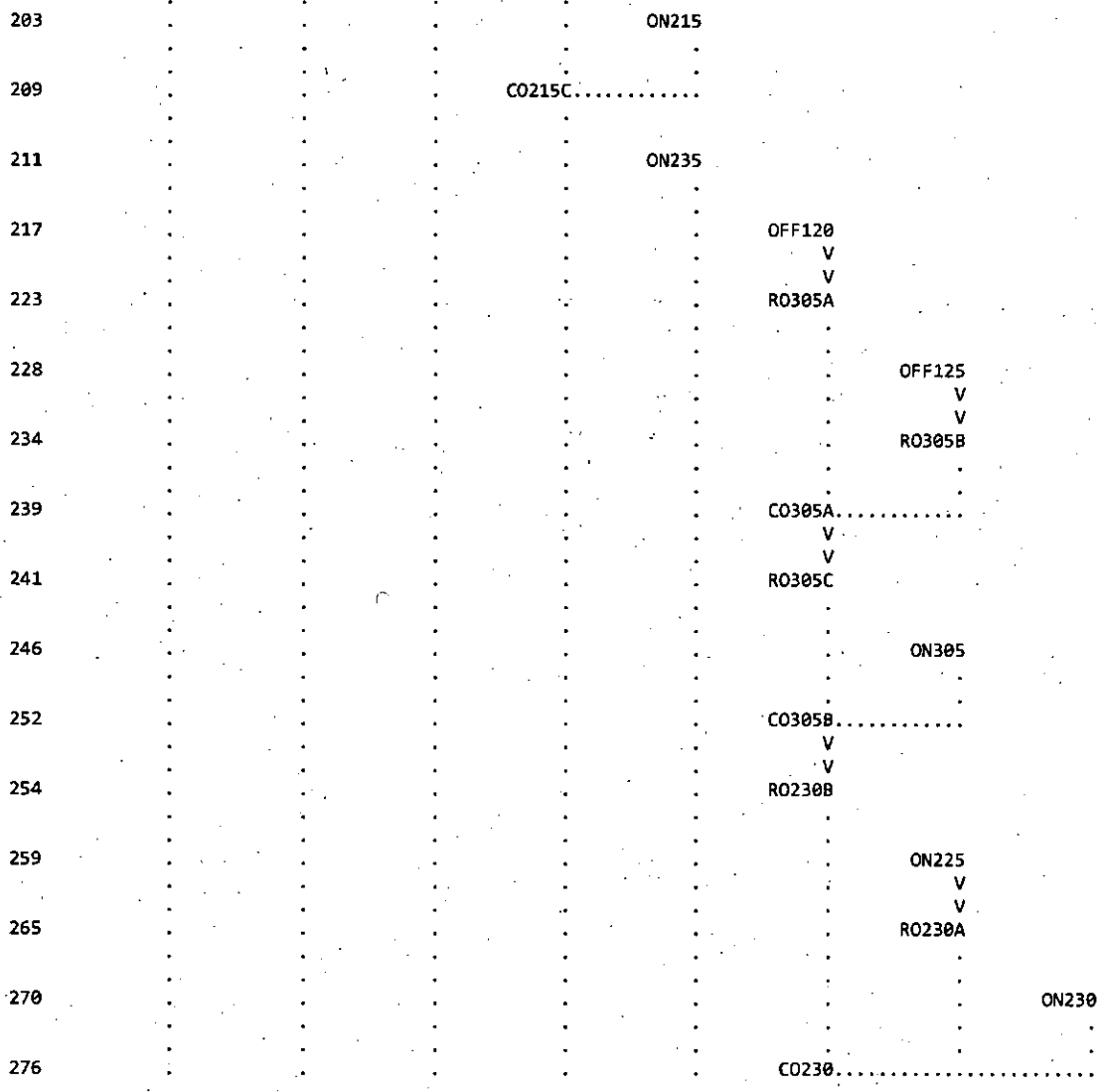
          276          KK   CO230 COMBINE
          277          HC       3
                       *
          278          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    23       OFF80
                V
                V
    29       RO115
                .
                .
    34          .       ON115
                .          .
                .          .
    40       CO115.........
                .
                .
    42          .       ON120
                .          .
                .          .
    48          .          .       OFF85
                .          .          V
                .          .          V
    54          .          .       RO125A
                .          .          .
                .          .          .
    59          .          .          .       OFF90
                .          .          .          V
                .          .          .          V
    65          .          .          .       RO125B
                .          .          .          .
                .          .          .          .
    70          .          .       CO125A.........
                .          .          V
```


77
ON125
83
CO125B
85
OFF95
91
RO140A
96
OFF100
102
RO140B
107
CO140A
109
RO140C
114
ON140
120
CO140B
122
ON130
128
ON135
134
ON145
140
ON150
146
CEX1
148
OFF105
154
RO215A
159
OFF110
165
OFF115
171
RO220
176
ON220
182
CO220
184
RO215D
189
CO215A
191
RO215B
196
CO215B



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   27OCT16  TIME  17:37:46   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

Flood Control District of Maricopa County
STORYROCK PH2 EX - STORYROCK PHASE 2 EXISTING CONDITION
2 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
10/27/2016

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

   IT           HYDROGRAPH TIME DATA
                    NMIN           5  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1JAN99  STARTING DATE
                    ITIME        0000  STARTING TIME
```

```
                NDTIME          2235  ENDING TIME
                ICENT             19  CENTURY MARK

           COMPUTATION INTERVAL    0.08 HOURS
               TOTAL TIME BASE  166.58 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

11 JD     INDEX STORM NO. 1
               STRM       1.42  PRECIPITATION DEPTH
               TRDA       0.00  TRANSPOSITION DRAINAGE AREA

12 PI       PRECIPITATION PATTERN
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00  0.00  0.01  0.01  0.01  0.01  0.01  0.01  0.03
              0.03  0.03  0.05  0.05  0.05  0.15  0.15  0.15  0.03  0.03
              0.03  0.01  0.01  0.01  0.01  0.01  0.01  0.00  0.00  0.00
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00

15 JD     INDEX STORM NO. 2
               STRM       1.41  PRECIPITATION DEPTH
               TRDA       0.50  TRANSPOSITION DRAINAGE AREA

16 PI       PRECIPITATION PATTERN
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00  0.00  0.01  0.01  0.01  0.01  0.01  0.01  0.03
              0.03  0.03  0.05  0.05  0.05  0.15  0.15  0.15  0.03  0.03
              0.03  0.01  0.01  0.01  0.01  0.01  0.01  0.00  0.00  0.00
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00

19 JD     INDEX STORM NO. 3
               STRM       1.38  PRECIPITATION DEPTH
               TRDA       2.80  TRANSPOSITION DRAINAGE AREA

20 PI       PRECIPITATION PATTERN
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00  0.00  0.01  0.01  0.01  0.01  0.01  0.01  0.03
              0.03  0.03  0.07  0.07  0.07  0.08  0.08  0.08  0.05  0.05
              0.05  0.02  0.02  0.02  0.01  0.01  0.01  0.00  0.00  0.00
              0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
              0.00  0.00
1
                                    RUNOFF SUMMARY
                              FLOW IN CUBIC FEET PER SECOND
                           TIME IN HOURS,  AREA IN SQUARE MILES

                                    PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM    TIME OF
          OPERATION      STATION    FLOW    PEAK      6-HOUR    24-HOUR    72-HOUR         AREA      STAGE    MAX STAGE
+
          HYDROGRAPH AT
+                        OFF80        9.    4.42         1.         0.         0.         0.04
          ROUTED TO
+                        RO115        9.    4.42         1.         0.         0.         0.04
          HYDROGRAPH AT
+                        ON115        2.    4.17         0.         0.         0.         0.00
          2 COMBINED AT
+                        CO115       10.    4.42         2.         0.         0.         0.05
          HYDROGRAPH AT
+                        ON120        0.    4.17         0.         0.         0.         0.00
```

+	ROUTED TO	RO125A	1.	4.17	0.	0.	0.	0.00
+	HYDROGRAPH AT	OFF90	2.	4.08	0.	0.	0.	0.00
+	ROUTED TO	RO125B	2.	4.08	0.	0.	0.	0.00
+	2 COMBINED AT	CO125A	3.	4.17	0.	0.	0.	0.00
+	ROUTED TO	RO125C	2.	4.17	0.	0.	0.	0.00
+	HYDROGRAPH AT	ON125	4.	4.25	1.	0.	0.	0.02
+	2 COMBINED AT	CO125B	6.	4.25	1.	0.	0.	0.02
+	HYDROGRAPH AT	OFF95	12.	4.42	2.	1.	0.	0.06
+	ROUTED TO	RO140A	12.	4.42	2.	1.	0.	0.06
+	HYDROGRAPH AT	OFF100	3.	4.25	0.	0.	0.	0.01
+	ROUTED TO	RO140B	3.	4.25	0.	0.	0.	0.01
+	2 COMBINED AT	CO140A	15.	4.42	2.	1.	0.	0.08
+	ROUTED TO	RO140C	14.	4.50	2.	1.	0.	0.08
+	HYDROGRAPH AT	ON140	4.	4.33	1.	0.	0.	0.02
+	2 COMBINED AT	CO140B	17.	4.50	3.	1.	0.	0.09
+	HYDROGRAPH AT	ON130	3.	4.25	0.	0.	0.	0.01
+	HYDROGRAPH AT	ON135	2.	4.25	0.	0.	0.	0.01
+	HYDROGRAPH AT	ON145	3.	4.25	0.	0.	0.	0.01
+	HYDROGRAPH AT	ON150	2.	4.17	0.	0.	0.	0.01
+	6 COMBINED AT	CEX1	30.	4.33	5.	1.	0.	0.16
+	HYDROGRAPH AT	OFF105	17.	4.42	3.	1.	0.	0.09
+	ROUTED TO	RO215A	16.	4.50	3.	1.	0.	0.09
+	HYDROGRAPH AT	OFF110	8.	4.33	1.	0.	0.	0.04
+	HYDROGRAPH AT	OFF115	3.	4.17	0.	0.	0.	0.01
+	ROUTED TO	RO220	3.	4.17	0.	0.	0.	0.01
+	HYDROGRAPH AT	ON220	1.	4.17	0.	0.	0.	0.00
	2 COMBINED AT							

	ROUTED TO						
+		RO215D	4.	4.17	0.	0.	0.	0.01
	2 COMBINED AT						
+		CO215A	12.	4.25	1.	0.	0.	0.05
	ROUTED TO						
+		RO215B	11.	4.33	1.	0.	0.	0.05
	2 COMBINED AT						
+		CO215B	26.	4.42	4.	1.	0.	0.13
	ROUTED TO						
+		RO215C	26.	4.50	4.	1.	0.	0.13
	HYDROGRAPH AT						
+		ON215	10.	4.25	1.	0.	0.	0.03
	2 COMBINED AT						
+		CO215C	32.	4.42	5.	1.	0.	0.16
	HYDROGRAPH AT						
+		ON235	1.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		OFF120	16.	4.42	3.	1.	0.	0.09
	ROUTED TO						
+		RO305A	16.	4.50	3.	1.	0.	0.09
	HYDROGRAPH AT						
+		OFF125	18.	4.42	4.	1.	0.	0.11
	ROUTED TO						
+		RO305B	18.	4.50	4.	1.	0.	0.11
	2 COMBINED AT						
+		CO305A	34.	4.50	7.	2.	1.	0.20
	ROUTED TO						
+		RO305C	33.	4.58	7.	2.	1.	0.20
	HYDROGRAPH AT						
+		ON305	6.	4.25	1.	0.	0.	0.02
	2 COMBINED AT						
+		CO305B	36.	4.58	7.	2.	1.	0.22
	ROUTED TO						
+		RO230B	37.	4.58	7.	2.	1.	0.22
	HYDROGRAPH AT						
+		ON225	2.	4.17	0.	0.	0.	0.00
	ROUTED TO						
+		RO230A	2.	4.25	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		ON230	2.	4.17	0.	0.	0.	0.01
	3 COMBINED AT						
+		CO230	38.	4.58	8.	2.	1.	0.24

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   27OCT16  TIME  17:37:50   *
*                                       *
*****************************************
```


```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (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        STORYROCK PH2 EX - STORYROCK PHASE 2 EXISTING CONDITION
  3           ID        10 YEAR
  4           ID        6 Hour  Storm
  5           ID        Unit Hydrograph: Clark
  6           ID        Storm: Multiple
  7           ID        10/27/2016
              *DIAGRAM
  8           IT       5  1JAN99       0    2000
  9           IO       5
 10           IN      15
              *
 11           JD   2.105  0.0001
 12           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
 13           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
 14           PC   0.962   0.972   0.983   0.991   1.000
 15           JD   2.092  0.5000
 16           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
 17           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
 18           PC   0.962   0.972   0.983   0.991   1.000
 19           JD   2.052 ,   2.8
 20           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
 21           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
 22           PC   0.950   0.963   0.975   0.988   1.000
              *

 23           KK   OFF80   BASIN
 24           BA   0.044
 25           LG    0.35    0.40    6.00    0.18       0
 26           UC   0.418   0.547
 27           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 28           UA     100
              *

 29           KK   RO115   ROUTE
 30           RS       1    FLOW
 31           RC   0.050   0.035   0.050     540  0.0260    0.00
 32           RX    0.00   12.00   18.00   18.50   19.00   27.00   29.00   34.00
 33           RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
```

```
      34          KK   ON115   BASIN
      35          BA   0.004
      36          LG    0.35    0.40    6.00    0.18       0
      37          UC   0.191   0.251
      38          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      39          UA     100
                  *

      40          KK   CO115 COMBINE
      41          HC       2
                  *
1                                        HEC-1 INPUT                                        PAGE  2

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

      42          KK   ON120   BASIN
      43          BA   0.001
      44          LG    0.35    0.40    6.00    0.18       0
      45          UC   0.172   0.391
      46          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      47          UA     100
                  *

      48          KK   OFF85   BASIN
      49          BA   0.002
      50          LG    0.35    0.40    6.00    0.18       0
      51          UC   0.135   0.145
      52          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      53          UA     100
                  *

      54          KK  RO125A   ROUTE
      55          RS       1    FLOW
      56          RC   0.050   0.035   0.050     525  0.0400    0.00
      57          RX    0.00    6.00   13.00   16.00   16.10   19.00   22.00   28.00
      58          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                  *

      59          KK   OFF90   BASIN
      60          BA   0.003
      61          LG    0.35    0.40    6.00    0.18       0
      62          UC   0.121   0.089
      63          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      64          UA     100
                  *

      65          KK  RO125B   ROUTE
      66          RS       1    FLOW
      67          RC   0.050   0.035   0.050     525  0.0400    0.00
      68          RX    0.00    6.00   13.00   16.00   16.10   19.00   22.00   28.00
      69          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                  *

      70          KK  CO125A COMBINE
      71          HC       2
                  *

      72          KK  RO125C   ROUTE
      73          RS       1    FLOW
      74          RC   0.050   0.035   0.050     720  0.0280    0.00
      75          RX    0.00    8.00   14.00   19.00   19.10   26.00   29.00   34.00
      76          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                  *
1                                        HEC-1 INPUT                                        PAGE  3

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

      77          KK   ON125   BASIN
      78          BA   0.017
      79          LG    0.35    0.40    6.00    0.18       0
      80          UC   0.323   0.444
      81          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      82          UA     100
                  *
```

```
                *
 85             KK   OFF95   BASIN
 86             BA   0.064
 87             LG    0.35    0.40    6.00    0.18       0
 88             UC   0.453   0.579
 89             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 90             UA     100
                *
 91             KK  RO140A   ROUTE
 92             RS       1    FLOW
 93             RC   0.050   0.035   0.050     333  0.0270    0.00
 94             RX    0.00   27.00   30.00   34.00   34.20   40.00   47.00   82.00
 95             RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *
 96             KK  OFF100   BASIN
 97             BA   0.011
 98             LG    0.35    0.40    6.00    0.18       0
 99             UC   0.258   0.331
100             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
101             UA     100
                *
102             KK  RO140B   ROUTE
103             RS       1    FLOW
104             RC   0.050   0.035   0.050     626  0.0340    0.00
105             RX    0.00    7.00    8.00   11.00   11.20   14.00   16.00   31.00
106             RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *
107             KK  CO140A COMBINE
108             HC       2
                *
109             KK  RO140C   ROUTE
110             RS       1    FLOW
111             RC   0.050   0.035   0.050    1210  0.0320    0.00
112             RX    0.00    3.00    6.00   11.00   11.20   17.00   23.00   48.00
113             RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *
1                                    HEC-1 INPUT                                    PAGE  4

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

114             KK   ON140   BASIN
115             BA   0.017
116             LG    0.35    0.40    6.00    0.18       0
117             UC   0.339   0.502
118             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
119             UA     100
                *
120             KK  CO140B COMBINE
121             HC       2
                *
122             KK   ON130   BASIN
123             BA   0.012
124             LG    0.35    0.40    6.00    0.18       0
125             UC   0.289   0.442
126             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
127             UA     100
                *
128             KK   ON135   BASIN
129             BA   0.008
130             LG    0.35    0.40    6.00    0.18       0
131             UC   0.250   0.344
132             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
133             UA     100
                *
134             KK   ON145   BASIN
135             BA   0.014
```

```
138          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
139          UA      100
             *

140          KK    ON150   BASIN
141          BA    0.007
142          LG     0.35    0.40    6.00    0.18       0
143          UC    0.220   0.270
144          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
145          UA      100
             *

146          KK     CEX1 COMBINE
147          HC        6
             *

148          KK   OFF105   BASIN
149          BA    0.085
150          LG     0.35    0.40    6.00    0.18       0
151          UC    0.447   0.552
152          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
153          UA      100
             *
1                                      HEC-1 INPUT                                        PAGE  5

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

154          KK   RO215A   ROUTE
155          RS        1    FLOW
156          RC    0.050   0.035   0.050     975  0.0360    0.00
157          RX     0.00    9.00   21.00   25.00   32.00   36.00   70.00   90.00
158          RY     2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

159          KK   OFF110   BASIN
160          BA    0.037
161          LG     0.35    0.40    6.00    0.18       0
162          UC    0.356   0.484
163          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
164          UA      100
             *

165          KK   OFF115   BASIN
166          BA    0.007
167          LG     0.35    0.40    6.00    0.18       0
168          UC    0.189   0.192
169          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
170          UA      100
             *

171          KK    RO220   ROUTE
172          RS        1    FLOW
173          RC    0.050   0.035   0.050     310  0.0420    0.00
174          RX     0.00    8.00   15.00   21.00   21.10   25.00   30.00   36.00
175          RY     2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

176          KK    ON220   BASIN
177          BA    0.003
178          LG     0.35    0.40    6.00    0.18       0
179          UC    0.184   0.266
180          UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
181          UA      100
             *

182          KK    CO220 COMBINE
183          HC        2
             *

184          KK   RO215D   ROUTE
185          RS        1    FLOW
186          RC    0.050   0.035   0.050     364  0.0300    0.00
187          RX     0.00    5.00    8.00   11.00   11.10   14.00   17.00   24.00
188          RY     3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
1                                      HEC-1 INPUT                                        PAGE  6
```

```
 240          HC       2
              *

 241          KK  RO305C   ROUTE
 242          RS       1    FLOW
 243          RC   0.050   0.035   0.050     653  0.0430    0.00
 244          RX    0.00   10.00   15.00   26.00   43.00  155.00  165.00  169.00
 245          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

 246          KK   ON305   BASIN
 247          BA   0.021
 248          LG    0.35    0.40    6.00    0.18       0
 249          UC   0.295   0.356
 250          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 251          UA     100
              *

 252          KK  CO305B COMBINE
 253          HC       2
              *

 254          KK  RO230B   ROUTE
 255          RS       1    FLOW
 256          RC   0.050   0.035   0.050     270  0.0480    0.00
 257          RX    0.00    9.00   30.00   45.00  118.00  122.00  127.00  132.00
 258          RY    2.00    1.00    0.50    0.00    0.00    1.00    2.00    3.00
              *
1                                         HEC-1 INPUT                                              PAGE  8

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

 259          KK   ON225   BASIN
 260          BA   0.005
 261          LG    0.35    0.40    6.00    0.18       0
 262          UC   0.186   0.214
 263          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 264          UA     100
              *

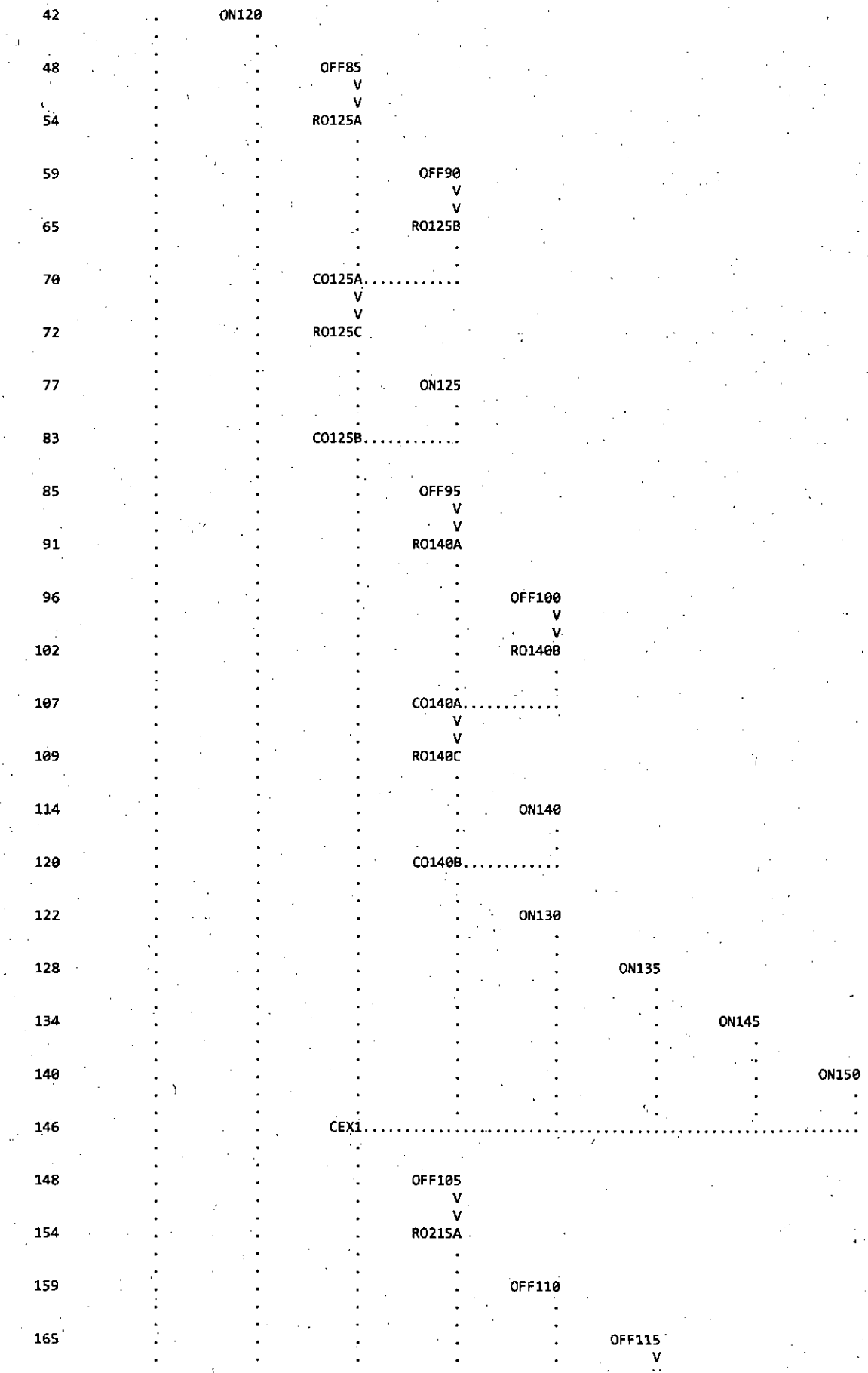
 265          KK  RO230A   ROUTE
 266          RS       1    FLOW
 267          RC   0.050   0.035   0.050     770  0.0340    0.00
 268          RX    0.00   10.00   20.00   35.00   51.00   61.00   68.00   73.00
 269          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

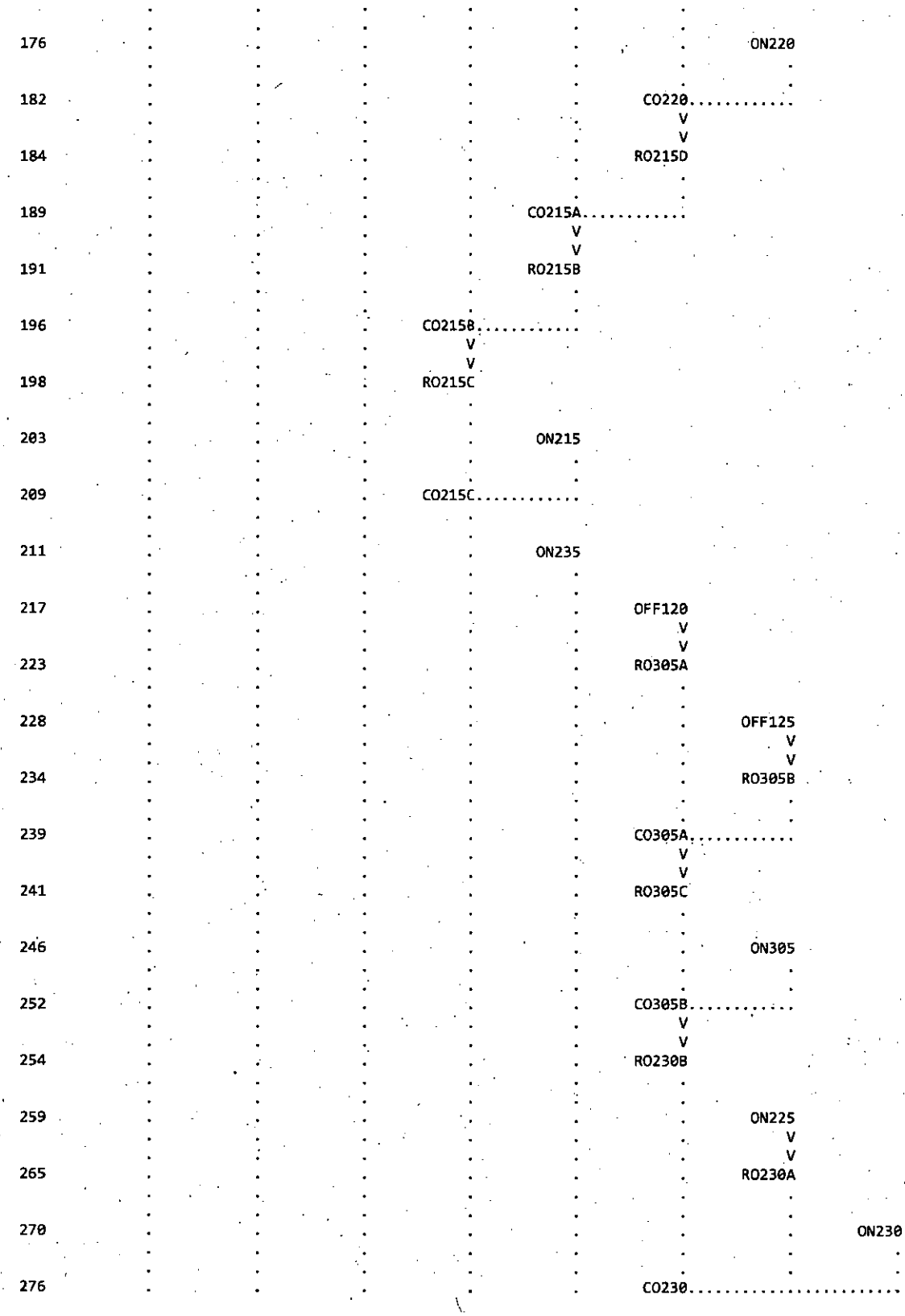
 270          KK   ON230   BASIN
 271          BA   0.007
 272          LG    0.35    0.40    6.00    0.18       0
 273          UC   0.230   0.283
 274          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 275          UA     100
              *

 276          KK   CO230 COMBINE
 277          HC       3
              *
 278          ZZ
1
         SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE    (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   23     OFF80
              V
              V
   29     RO115
              .
              .
   34         .          ON115
              .            .
              .            .
   40     CO115............
```


42
ON120
48
OFF85
54
RO125A
59
OFF90
65
RO125B
70
CO125A
72
RO125C
77
ON125
83
CO125B
85
OFF95
91
RO140A
96
OFF100
102
RO140B
107
CO140A
109
RO140C
114
ON140
120
CO140B
122
ON130
128
ON135
134
ON145
140
ON150
146
CEX1
148
OFF105
154
RO215A
159
OFF110
165
OFF115



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

* *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* JUN 1998 *

* VERSION 4.1 *

* *

****

* *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

* 609 SECOND STREET *

* DAVIS, CALIFORNIA 95616 *

****

****

Flood Control District of Maricopa County
STORYROCK PH2 EX - STORYROCK PHASE 2 EXISTING CONDITION
10 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
10/27/2016

9 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	5	MINUTES IN COMPUTATION INTERVAL
IDATE	1JAN99	STARTING DATE
ITIME	0000	STARTING TIME
NQ	2000	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	7JAN99	ENDING DATE
NDTIME	2235	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL 0.08 HOURS
TOTAL TIME BASE 166.58 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

11 JD INDEX STORM NO. 1

STRM	2.11	PRECIPITATION DEPTH
TRDA	0.00	TRANSPOSITION DRAINAGE AREA

12 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

15 JD INDEX STORM NO. 2

STRM	2.09	PRECIPITATION DEPTH
TRDA	0.50	TRANSPOSITION DRAINAGE AREA

16 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

19 JD INDEX STORM NO. 3

STRM	2.05	PRECIPITATION DEPTH
TRDA	2.80	TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03

0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00

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	OFF80	26.	4.33	3.	1.	0.	0.04		
+	ROUTED TO	RO115	26.	4.33	3.	1.	0.	0.04		
+	HYDROGRAPH AT	ON115	4.	4.08	0.	0.	0.	0.00		
+	2 COMBINED AT	CO115	28.	4.33	4.	1.	0.	0.05		
+	HYDROGRAPH AT	ON120	1.	4.17	0.	0.	0.	0.00		
+	HYDROGRAPH AT	OFF85	3.	4.08	0.	0.	0.	0.00		
+	ROUTED TO	RO125A	3.	4.08	0.	0.	0.	0.00		
+	HYDROGRAPH AT	OFF90	5.	4.00	0.	0.	0.	0.00		
+	ROUTED TO	RO125B	4.	4.08	0.	0.	0.	0.00		
+	2 COMBINED AT	CO125A	7.	4.08	0.	0.	0.	0.00		
+	ROUTED TO	RO125C	7.	4.08	0.	0.	0.	0.00		
+	HYDROGRAPH AT	ON125	12.	4.25	1.	0.	0.	0.02		
+	2 COMBINED AT	CO125B	17.	4.17	2.	0.	0.	0.02		
+	HYDROGRAPH AT	OFF95	36.	4.33	5.	1.	0.	0.06		
+	ROUTED TO	RO140A	36.	4.33	5.	1.	0.	0.06		
+	HYDROGRAPH AT	OFF100	9.	4.17	1.	0.	0.	0.01		
+	ROUTED TO	RO140B	9.	4.17	1.	0.	0.	0.01		
+	2 COMBINED AT	CO140A	43.	4.33	6.	1.	0.	0.08		
+	ROUTED TO	RO140C	42.	4.33	6.	1.	0.	0.08		
+	HYDROGRAPH AT	ON140	11.	4.25	1.	0.	0.	0.02		
+	2 COMBINED AT	CO140B	52.	4.33	7.	2.	1.	0.09		
+	HYDROGRAPH AT	ON130	8.	4.17	1.	0.	0.	0.01		

	HYDROGRAPH AT						
+		ON145	9.	4.25	1.	0.	0.	0.01
	HYDROGRAPH AT						
+		ON150	7.	4.17	1.	0.	0.	0.01
	6 COMBINED AT						
+		CEX1	90.	4.25	12.	3.	1.	0.16
	HYDROGRAPH AT						
+		OFF105	49.	4.33	7.	2.	1.	0.09
	ROUTED TO						
+		RO215A	46.	4.42	7.	2.	1.	0.09
	HYDROGRAPH AT						
+		OFF110	24.	4.25	3.	1.	0.	0.04
	HYDROGRAPH AT						
+		OFF115	8.	4.08	1.	0.	0.	0.01
	ROUTED TO						
+		RO220	8.	4.17	1.	0.	0.	0.01
	HYDROGRAPH AT						
+		ON220	3.	4.08	0.	0.	0.	0.00
	2 COMBINED AT						
+		CO220	11.	4.08	1.	0.	0.	0.01
	ROUTED TO						
+		RO215D	11.	4.17	1.	0.	0.	0.01
	2 COMBINED AT						
+		CO215A	33.	4.25	4.	1.	0.	0.05
	ROUTED TO						
+		RO215B	32.	4.25	4.	1.	0.	0.05
	2 COMBINED AT						
+		CO215B	75.	4.33	10.	3.	1.	0.13
	ROUTED TO						
+		RO215C	74.	4.33	10.	3.	1.	0.13
	HYDROGRAPH AT						
+		ON215	28.	4.17	2.	1.	0.	0.03
	2 COMBINED AT						
+		CO215C	93.	4.33	13.	3.	1.	0.16
	HYDROGRAPH AT						
+		ON235	2.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		OFF120	47.	4.33	7.	2.	1.	0.09
	ROUTED TO						
+		RO305A	46.	4.42	7.	2.	1.	0.09
	HYDROGRAPH AT						
+		OFF125	52.	4.33	9.	2.	1.	0.11
	ROUTED TO						
+		RO305B	52.	4.42	9.	2.	1.	0.11
	2 COMBINED AT						
+		CO305A	98.	4.42	16.	4.	1.	0.20
	ROUTED TO						
+		RO305C	97.	4.42	16.	4.	1.	0.20
	HYDROGRAPH AT						
+		ON305	17.	4.17	2.	0.	0.	0.02
	2 COMBINED AT						

	ROUTED TO						
+	RO230B	108.	4.42	18.	4.	1.	0.22
	HYDROGRAPH AT						
+	ON225	6.	4.08	0.	0.	0.	0.00
	ROUTED TO						
+	RO230A	5.	4.17	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	ON230	7.	4.17	1.	0.	0.	0.01
	3 COMBINED AT						
+	CO230	113.	4.42	19.	5.	2.	0.24

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

```
34          KK   ON115   BASIN
35          BA   0.004
36          LG    0.35    0.40    6.00    0.18       0
37          UC   0.144   0.183
38          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
39          UA     100
            *

40          KK   CO115 COMBINE
41          HC       2
            *
1                                        HEC-1 INPUT                                    PAGE  2

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

42          KK   ON120   BASIN
43          BA   0.001
44          LG    0.35    0.40    6.00    0.18       0
45          UC   0.129   0.285
46          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
47          UA     100
            *

48          KK   OFF85   BASIN
49          BA   0.002
50          LG    0.35    0.40    6.00    0.18       0
51          UC   0.101   0.106
52          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
53          UA     100
            *

54          KK  RO125A   ROUTE
55          RS       1    FLOW
56          RC   0.050   0.035   0.050     525  0.0400    0.00
57          RX    0.00    6.00   13.00   16.00   16.10   19.00   22.00   28.00
58          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
            *

59          KK   OFF90   BASIN
60          BA   0.003
61          LG    0.35    0.40    6.00    0.18       0
62          UC   0.091   0.065
63          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
64          UA     100
            *

65          KK  RO125B   ROUTE
66          RS       1    FLOW
67          RC   0.050   0.035   0.050     525  0.0400    0.00
68          RX    0.00    6.00   13.00   16.00   16.10   19.00   22.00   28.00
69          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
            *

70          KK  CO125A COMBINE
71          HC       2
            *

72          KK  RO125C   ROUTE
73          RS       1    FLOW
74          RC   0.050   0.035   0.050     720  0.0280    0.00
75          RX    0.00    8.00   14.00   19.00   19.10   26.00   29.00   34.00
76          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
            *
1                                        HEC-1 INPUT                                    PAGE  3

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

77          KK   ON125   BASIN
78          BA   0.017
79          LG    0.35    0.40    6.00    0.18       0
80          UC   0.243   0.323
81          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
82          UA     100
            *
```

```
189          KK  CO215A COMBINE
190          HC       2
             *

191          KK  RO215B   ROUTE
192          RS       1    FLOW
193          RC   0.050   0.035   0.050     800  0.0340    0.00
194          RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
195          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

196          KK  CO215B COMBINE
197          HC       2
             *

198          KK  RO215C   ROUTE
199          RS       1    FLOW
200          RC   0.050   0.035   0.050     445  0.0340    0.00
201          RX    0.00   12.00   28.00   36.00   48.00   71.00   73.00   76.00
202          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

203          KK   ON215   BASIN
204          BA   0.030
205          LG    0.35    0.40    6.00    0.18       0
206          UC   0.218   0.202
207          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
208          UA     100
             *

209          KK  CO215C COMBINE
210          HC       2
             *

211          KK   ON235   BASIN
212          BA   0.002
213          LG    0.35    0.40    6.00    0.18       0
214          UC   0.110   0.132
215          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
216          UA     100
             *

217          KK  OFF120   BASIN
218          BA   0.095
219          LG    0.35    0.40    6.00    0.18       0
220          UC   0.354   0.489
221          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
222          UA     100
             *
```



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

223          KK  RO305A   ROUTE
224          RS       1    FLOW
225          RC   0.050   0.035   0.050     685  0.0480    0.00
226          RX    0.00   10.00   21.00   30.00   43.00   61.00   68.00   75.00
227          RY    3.00    2.00    1.00    0.00    0.00    1.00    0.00    1.00
             *

228          KK  OFF125   BASIN
229          BA   0.109
230          LG    0.35    0.40    6.00    0.18       2
231          UC   0.374   0.528
232          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
233          UA     100
             *

234          KK  RO305B   ROUTE
235          RS       1    FLOW
236          RC   0.050   0.035   0.050     970  0.0480    0.00
237          RX    0.00    6.00    8.00   20.00   32.00   43.00   51.00   66.00
238          RY    3.00    2.00    1.00    0.00    0.00    1.00    1.50    2.00
             *
```

```
          240            HC        2
                         *

          241            KK  RO305C   ROUTE
          242            RS       1    FLOW
          243            RC   0.050   0.035   0.050     653  0.0430    0.00
          244            RX    0.00   10.00   15.00   26.00   43.00  155.00  165.00  169.00
          245            RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                         *

          246            KK   ON305   BASIN
          247            BA   0.021
          248            LG    0.35    0.40    6.00    0.18       0
          249            UC   0.222   0.259
          250            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          251            UA     100
                         *

          252            KK  CO305B COMBINE
          253            HC       2
                         *

          254            KK  RO230B   ROUTE
          255            RS       1    FLOW
          256            RC   0.050   0.035   0.050     270  0.0480    0.00
          257            RX    0.00    9.00   30.00   45.00  118.00  122.00  127.00  132.00
          258            RY    2.00    1.00    0.50    0.00    0.00    1.00    2.00    3.00
                         *
1                                                       HEC-1 INPUT                                         PAGE  8

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


          259            KK   ON225   BASIN
          260            BA   0.005
          261            LG    0.35    0.40    6.00    0.18       0
          262            UC   0.140   0.156
          263            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          264            UA     100
                         *

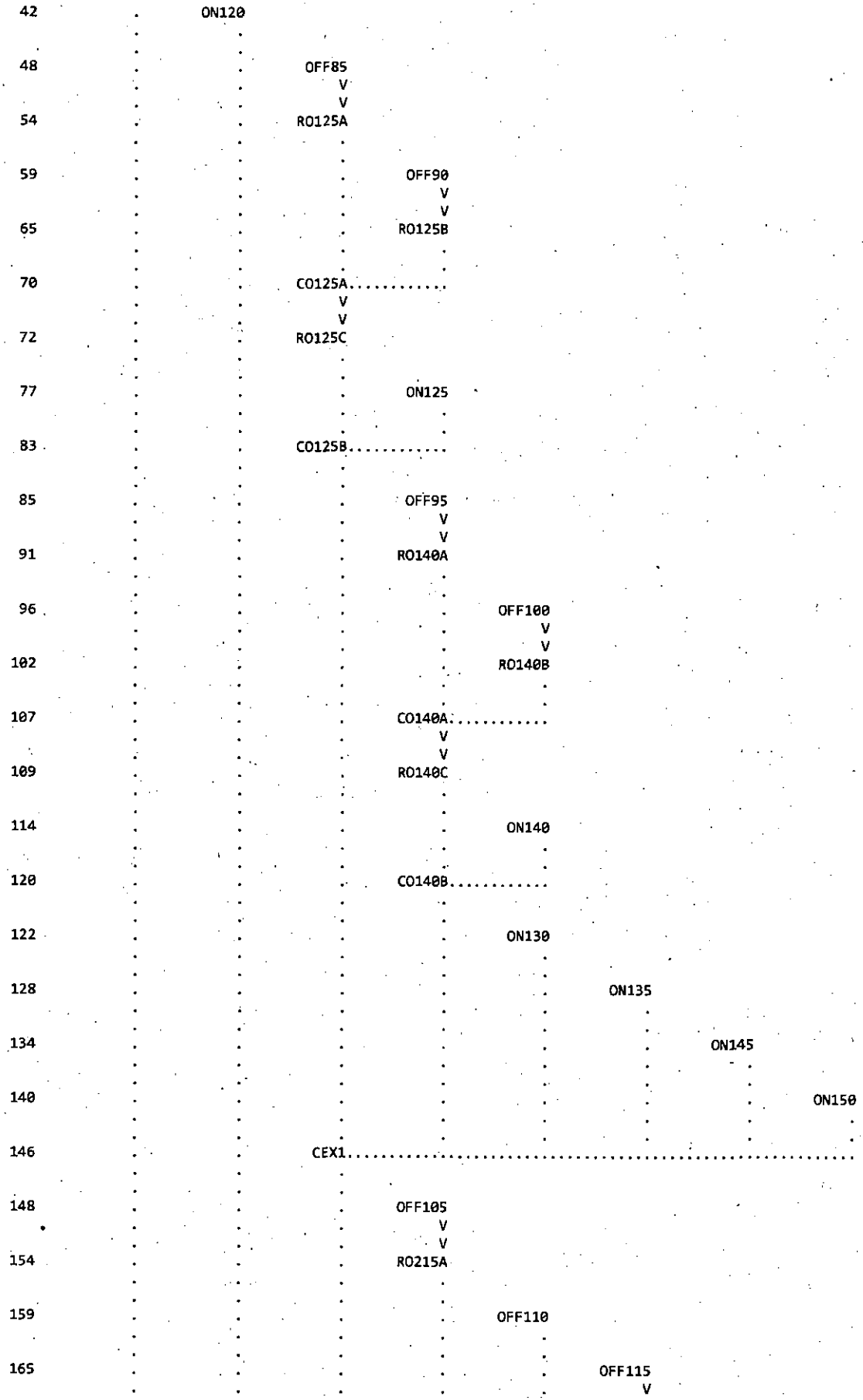
          265            KK  RO230A   ROUTE
          266            RS       1    FLOW
          267            RC   0.050   0.035   0.050     770  0.0340    0.00
          268            RX    0.00   10.00   20.00   35.00   51.00   61.00   68.00   73.00
          269            RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                         *

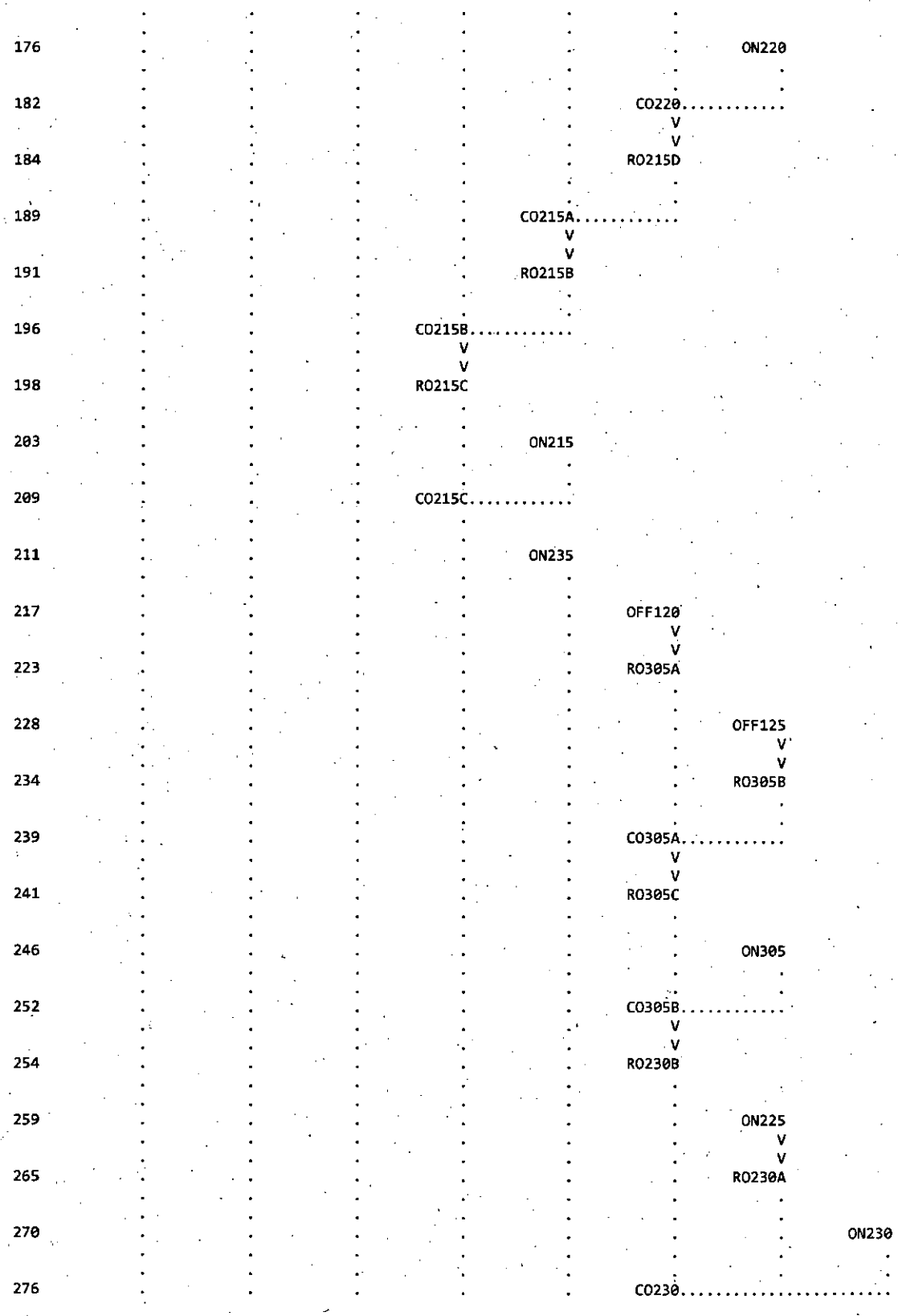
          270            KK   ON230   BASIN
          271            BA   0.007
          272            LG    0.35    0.40    6.00    0.18       0
          273            UC   0.173   0.206
          274            UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          275            UA     100
                         *

          276            KK   CO230 COMBINE
          277            HC       3
                         *
          278            ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING            (--->) DIVERSION OR PUMP FLOW

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

    23       OFF80
                 V
                 V
    29       RO115
                 .
                 .
    34           .         ON115
                 .             .
                 .             .
    40       CO115.............
```


42
ON120
48
OFF85
54
RO125A
59
OFF90
65
RO125B
70
CO125A
72
RO125C
77
ON125
83
CO125B
85
OFF95
91
RO140A
96
OFF100
102
RO140B
107
CO140A
109
RO140C
114
ON140
120
CO140B
122
ON130
128
ON135
134
ON145
140
ON150
146
CEX1
148
OFF105
154
RO215A
159
OFF110
165
OFF115



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

* *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* JUN 1998 *

* VERSION 4.1 *

* *

****

* *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

* 609 SECOND STREET *

* DAVIS, CALIFORNIA 95616 *

****

****

Flood Control District of Maricopa County
STORYROCK PH2 EX - STORYROCK PHASE 2 EXISTING CONDITION
100 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
10/27/2016

9 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	5	MINUTES IN COMPUTATION INTERVAL
IDATE	1JAN99	STARTING DATE
ITIME	0000	STARTING TIME
NQ	2000	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	7JAN99	ENDING DATE
NDTIME	2235	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL 0.08 HOURS
TOTAL TIME BASE 166.58 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

11 JD INDEX STORM NO. 1

STRM	3.17	PRECIPITATION DEPTH
TRDA	0.00	TRANSPOSITION DRAINAGE AREA

12 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

15 JD INDEX STORM NO. 2

STRM	3.15	PRECIPITATION DEPTH
TRDA	0.50	TRANSPOSITION DRAINAGE AREA

16 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

19 JD INDEX STORM NO. 3

STRM	3.10	PRECIPITATION DEPTH
TRDA	2.80	TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03

0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00

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	OFF80	63.	4.25	7.	2.	1.	0.04		
+	ROUTED TO	RO115	64.	4.25	7.	2.	1.	0.04		
+	HYDROGRAPH AT	ON115	9.	4.08	1.	0.	0.	0.00		
+	2 COMBINED AT	CO115	69.	4.25	8.	2.	1.	0.05		
+	HYDROGRAPH AT	ON120	2.	4.08	0.	0.	0.	0.00		
+	HYDROGRAPH AT	OFF85	6.	4.00	0.	0.	0.	0.00		
+	ROUTED TO	RO125A	5.	4.00	0.	0.	0.	0.00		
+	HYDROGRAPH AT	OFF90	9.	4.00	1.	0.	0.	0.00		
+	ROUTED TO	RO125B	9.	4.00	1.	0.	0.	0.00		
+	2 COMBINED AT	CO125A	15.	4.00	1.	0.	0.	0.00		
+	ROUTED TO	RO125C	14.	4.08	1.	0.	0.	0.00		
+	HYDROGRAPH AT	ON125	28.	4.17	3.	1.	0.	0.02		
+	2 COMBINED AT	CO125B	40.	4.08	4.	1.	0.	0.02		
+	HYDROGRAPH AT	OFF95	89.	4.25	11.	3.	1.	0.06		
+	ROUTED TO	RO140A	90.	4.25	11.	3.	1.	0.06		
+	HYDROGRAPH AT	OFF100	22.	4.08	2.	0.	0.	0.01		
+	ROUTED TO	RO140B	21.	4.17	2.	0.	0.	0.01		
+	2 COMBINED AT	CO140A	107.	4.25	12.	3.	1.	0.08		
+	ROUTED TO	RO140C	107.	4.25	12.	3.	1.	0.08		
+	HYDROGRAPH AT	ON140	26.	4.17	3.	1.	0.	0.02		
+	2 COMBINED AT	CO140B	130.	4.25	15.	4.	1.	0.09		
+	HYDROGRAPH AT	ON130	20.	4.17	2.	1.	0.	0.01		

+	HYDROGRAPH AT ON145	23.	4.17	2.	1.	0.	0.01
+	HYDROGRAPH AT ON150	16.	4.08	1.	0.	0.	0.01
+	6 COMBINED AT CEX1	230.	4.17	26.	6.	2.	0.16
+	HYDROGRAPH AT OFF105	122.	4.25	14.	4.	1.	0.09
+	ROUTED TO RO215A	116.	4.25	14.	4.	1.	0.09
+	HYDROGRAPH AT OFF110	58.	4.17	6.	2.	1.	0.04
+	HYDROGRAPH AT OFF115	17.	4.08	1.	0.	0.	0.01
+	ROUTED TO RO220	17.	4.08	1.	0.	0.	0.01
+	HYDROGRAPH AT ON220	7.	4.08	1.	0.	0.	0.00
+	2 COMBINED AT CO220	24.	4.08	2.	0.	0.	0.01
+	ROUTED TO RO215D	24.	4.08	2.	0.	0.	0.01
+	2 COMBINED AT CO215A	79.	4.17	8.	2.	1.	0.05
+	ROUTED TO RO215B	77.	4.17	8.	2.	1.	0.05
+	2 COMBINED AT CO215B	190.	4.25	22.	5.	2.	0.13
+	ROUTED TO RO215C	189.	4.25	22.	5.	2.	0.13
+	HYDROGRAPH AT ON215	64.	4.08	5.	1.	0.	0.03
+	2 COMBINED AT CO215C	233.	4.25	27.	7.	2.	0.16
+	HYDROGRAPH AT ON235	5.	4.00	0.	0.	0.	0.00
+	HYDROGRAPH AT OFF120	121.	4.25	16.	4.	1.	0.09
+	ROUTED TO RO305A	119.	4.25	16.	4.	1.	0.09
+	HYDROGRAPH AT OFF125	132.	4.25	19.	5.	2.	0.11
+	ROUTED TO RO305B	129.	4.33	19.	5.	2.	0.11
+	2 COMBINED AT CO305A	247.	4.25	34.	9.	3.	0.20
+	ROUTED TO RO305C	247.	4.33	34.	9.	3.	0.20
+	HYDROGRAPH AT ON305	39.	4.08	4.	1.	0.	0.02
+	2 COMBINED AT						

	ROUTED TO						
+	RO230B	271.	4.33	38.	9.	3.	0.22
	HYDROGRAPH AT						
+	ON225	12.	4.08	1.	0.	0.	0.00
	ROUTED TO						
+	RO230A	11.	4.08	1.	0.	0.	0.00
	HYDROGRAPH AT						
+	ON230	15.	4.08	1.	0.	0.	0.01
	3 COMBINED AT						
+	CO230	283.	4.33	40.	10.	3.	0.24

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

Proposed Condition

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: STORYROCK PH2 PROP

Area ID	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
OFF80	0.042	0.59	188.0	188.0	NATURAL	0.060	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.503	0.469	0.418	0.368	0.338	0.314
												Vel (f/s)	1.72	1.85	2.07	2.35	2.56	2.76
												R (Hrs)	0.690	0.638	0.562	0.487	0.444	0.409
OFF85	0.001	0.06	406.8	289.7	NATURAL	0.083	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.166*	0.155*	0.138*	0.121*	0.112*	0.104 *
												Vel (f/s)	0.53	0.57	0.64	0.73	0.79	0.85
												R (Hrs)	0.273	0.252	0.222	0.193	0.175	0.162
OFF90	0.002	0.05	369.6	282.4	NATURAL	0.079	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.149*	0.139*	0.124*	0.109*	0.100*	0.093 *
												Vel (f/s)	0.49	0.53	0.59	0.67	0.73	0.79
												R (Hrs)	0.141	0.130	0.114	0.099	0.090	0.083
OFF95	0.063	0.74	197.8	197.8	NATURAL	0.058	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.545	0.508	0.453	0.399	0.366	0.341
												Vel (f/s)	1.99	2.14	2.40	2.72	2.97	3.18
												R (Hrs)	0.717	0.663	0.584	0.507	0.461	0.425
OFF100	0.009	0.23	253.3	241.8	NATURAL	0.070	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.315	0.293*	0.262*	0.230*	0.211*	0.197 *
												Vel (f/s)	1.07	1.15	1.29	1.47	1.60	1.71
												R (Hrs)	0.464	0.429	0.378	0.328	0.298	0.275
OFF105	0.084	0.87	275.2	253.3	NATURAL	0.056	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.538	0.501	0.447	0.393	0.361	0.336
												Vel (f/s)	2.37	2.55	2.85	3.25	3.53	3.80
												R (Hrs)	0.683	0.631	0.555	0.482	0.439	0.405
OFF110	0.036	0.56	470.3	299.0	NATURAL	0.061	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.428	0.399	0.356	0.313	0.288*	0.268 *
												Vel (f/s)	1.92	2.06	2.31	2.62	2.85	3.06
												R (Hrs)	0.604	0.558	0.492	0.427	0.388	0.358
OFF115	0.005	0.13	375.0	283.6	NATURAL	0.073	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.230*	0.215*	0.191*	0.168*	0.155*	0.144 *
												Vel (f/s)	0.83	0.89	1.00	1.13	1.23	1.32
												R (Hrs)	0.290	0.269	0.236	0.205	0.187	0.172
OFF120	0.094	1.12	628.7	313.0	NATURAL	0.056	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.572	0.533	0.475	0.418	0.384	0.357
												Vel (f/s)	2.87	3.08	3.46	3.93	4.28	4.60
												R (Hrs)	0.838	0.775	0.682	0.592	0.539	0.497

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: STORYROCK PH2 PROP

Area ID	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
OFF125	0.108	1.26	773.1	313.0	NATURAL	0.055	0.35	0.40	6.00	0.176	2	**Tc (Hrs)**	0.594	0.554	0.495	0.437	0.402	0.374
												Vel (f/s)	3.11	3.34	3.73	4.23	4.60	4.94
												R (Hrs)	0.887	0.822	0.725	0.631	0.575	0.531
ON115	0.007	0.34	154.3	154.3	NATURAL	0.046	0.26	0.29	6.00	0.203	26	**Tc (Hrs)**	0.302	0.287*	0.263*	0.237*	0.221*	0.209 *
												Vel (f/s)	1.65	1.74	1.90	2.10	2.26	2.39
												R (Hrs)	0.698	0.661	0.599	0.533	0.495	0.464
ON125	0.011	0.18	250.0	239.9	NATURAL	0.047	0.32	0.30	6.00	0.170	11	**Tc (Hrs)**	0.205*	0.193*	0.175*	0.155*	0.144*	0.136 *
												Vel (f/s)	1.29	1.37	1.51	1.70	1.83	1.94
												R (Hrs)	0.211	0.198	0.177	0.155	0.143	0.134
ON126	0.007	0.16	205.0	204.8	NATURAL	0.048	0.32	0.30	6.00	0.203	18	**Tc (Hrs)**	0.203*	0.192*	0.175*	0.156*	0.145*	0.137 *
												Vel (f/s)	1.16	1.22	1.34	1.50	1.62	1.71
												R (Hrs)	0.246	0.231	0.208	0.184	0.170	0.158
ON130	0.013	0.32	209.4	208.9	NATURAL	0.052	0.33	0.33	6.00	0.183	10	**Tc (Hrs)**	0.308	0.290*	0.262*	0.233*	0.216*	0.202 *
												Vel (f/s)	1.52	1.62	1.79	2.01	2.17	2.32
												R (Hrs)	0.478	0.448	0.400	0.350	0.322	0.300
ON135	0.009	0.19	183.8	183.8	NATURAL	0.070	0.31	0.27	6.00	0.212	31	**Tc (Hrs)**	0.262*	0.250*	0.229*	0.207*	0.194*	0.183 *
												Vel (f/s)	1.06	1.11	1.22	1.35	1.44	1.52
												R (Hrs)	0.325	0.309	0.280	0.251	0.233	0.218
ON140	0.016	0.51	163.4	163.4	NATURAL	0.052	0.29	0.33	6.00	0.189	16	**Tc (Hrs)**	0.406	0.385	0.349	0.312	0.290*	0.273 *
												Vel (f/s)	1.84	1.94	2.14	2.40	2.58	2.74
												R (Hrs)	0.838	0.789	0.709	0.626	0.577	0.539
ON141	0.005	0.10	115.4	115.4	NATURAL	0.044	0.31	0.28	6.00	0.209	22	**Tc (Hrs)**	0.179*	0.170*	0.155*	0.139*	0.130*	0.122 *
												Vel (f/s)	0.82	0.86	0.95	1.06	1.13	1.20
												R (Hrs)	0.178	0.168	0.152	0.135	0.125	0.117
ON145	0.005	0.18	232.0	227.7	NATURAL	0.059	0.25	0.34	6.00	0.209	24	**Tc (Hrs)**	0.226*	0.215*	0.196*	0.177*	0.165*	0.155 *
												Vel (f/s)	1.17	1.23	1.35	1.49	1.60	1.70
												R (Hrs)	0.369	0.349	0.315	0.281	0.260	0.243

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: STORYROCK PH2 PROP

Area ID	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
ON150	0.009	0.15	180.0	180.0	NATURAL	0.043	0.31	0.28	6.00	0.191	15	**Tc (Hrs)**	0.193*	0.182*	0.165*	0.148*	0.137*	0.129 *
												Vel (f/s)	1.14	1.21	1.33	1.49	1.61	1.71
												R (Hrs)	0.191	0.180	0.161	0.142	0.131	0.123
ON151	0.007	0.12	184.9	184.9	NATURAL	0.041	0.31	0.27	6.00	0.210	23	**Tc (Hrs)**	0.162*	0.154*	0.141*	0.127*	0.118*	0.111 *
												Vel (f/s)	1.09	1.14	1.25	1.39	1.49	1.59
												R (Hrs)	0.153	0.144	0.130	0.116	0.107	0.100
ON220	0.003	0.11	293.6	261.0	NATURAL	0.076	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.222*	0.207*	0.184*	0.162*	0.149*	0.139 *
												Vel (f/s)	0.73	0.78	0.88	1.00	1.08	1.16
												R (Hrs)	0.326	0.302	0.266	0.231	0.210	0.194
ON215	0.023	0.51	179.1	179.1	NATURAL	0.041	0.31	0.29	6.00	0.195	15	**Tc (Hrs)**	0.349	0.330	0.300	0.267*	0.249*	0.234 *
												Vel (f/s)	2.14	2.27	2.49	2.80	3.00	3.20
												R (Hrs)	0.576	0.542	0.486	0.429	0.395	0.369
ON216	0.008	0.16	119.5	119.5	NATURAL	0.040	0.31	0.27	6.00	0.212	18	**Tc (Hrs)**	0.216*	0.205*	0.187*	0.167*	0.155*	0.146 *
												Vel (f/s)	1.09	1.14	1.25	1.41	1.51	1.61
												R (Hrs)	0.245	0.231	0.208	0.184	0.170	0.158
ON225	0.005	0.12	254.2	242.4	NATURAL	0.073	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.232*	0.216*	0.193*	0.170*	0.156*	0.145 *
												Vel (f/s)	0.76	0.81	0.91	1.04	1.13	1.21
												R (Hrs)	0.275	0.254	0.224	0.194	0.177	0.163
ON230	0.007	0.16	208.6	208.1	NATURAL	0.041	0.31	0.27	6.00	0.168	15	**Tc (Hrs)**	0.183*	0.173*	0.156*	0.140*	0.131*	0.123 *
												Vel (f/s)	1.28	1.36	1.50	1.68	1.79	1.91
												R (Hrs)	0.219	0.206	0.184	0.163	0.151	0.141
ON235	0.001	0.01	1125.0	313.0	NATURAL	0.050	0.31	0.28	6.00	0.168	14	**Tc (Hrs)**	0.045*	0.042*	0.038*	0.034*	0.032*	0.030 *
												Vel (f/s)	0.33	0.35	0.39	0.43	0.46	0.49
												R (Hrs)	0.015	0.014	0.013	0.011	0.010	0.010
ON305	0.022	0.33	271.9	251.8	NATURAL	0.064	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.356	0.331	0.295*	0.260*	0.239*	0.222 *
												Vel (f/s)	1.36	1.46	1.64	1.86	2.03	2.18
												R (Hrs)	0.426	0.394	0.347	0.301	0.274	0.253

* Non default value or value out of range

Area ID	Sub Basin Parameters						Rainfall Losses					Return Period Parameters					
	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: STORYROCK PH2 PROP

n	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
100	DESERT	0.0090	100.0	0.35	0	25.0	DRY	0.070	Desert
		0.0090	**100.0**						
105	DESERT	0.0840	100.0	0.35	0	25.0	DRY	0.056	Desert
		0.0840	**100.0**						
110	DESERT	0.0360	100.0	0.35	0	25.0	DRY	0.061	Desert
		0.0360	**100.0**						
115	DESERT	0.0050	100.0	0.35	0	25.0	DRY	0.073	Desert
		0.0050	**100.0**						
120	DESERT	0.0940	100.0	0.35	0	25.0	DRY	0.056	Desert
		0.0940	**100.0**						
125	DESERT	0.1080	100.0	0.35	0	25.0	DRY	0.055	Desert
		0.1080	**100.0**						
80	DESERT	0.0420	100.0	0.35	0	25.0	DRY	0.060	Desert
		0.0420	**100.0**						
85	DESERT	0.0010	100.0	0.35	0	25.0	DRY	0.083	Desert
		0.0010	**100.0**						
90	DESERT	0.0020	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0020	**100.0**						
95	DESERT	0.0630	100.0	0.35	0	25.0	DRY	0.058	Desert
		0.0630	**100.0**						
15	DESERT	0.0020	28.6	0.35	0	25.0	DRY	0.071	Desert

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: STORYROCK PH2 PROP

n	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
	R1-18	0.0010	14.3	0.30	27	50.0	NORMAL	0.036	Residential 18,000 sq-ft lots
	R1-43	0.0020	28.6	0.30	17	20.0	NORMAL	0.036	Residential 43,000 sq-ft lots
	ROAD	0.0020	28.6	0.10	60	75.0	NORMAL	0.036	Local Roadway 40' Tract 24' BC
		0.0070	**100.1**						
25	DESERT	0.0040	36.4	0.35	0	25.0	DRY	0.068	Desert
	R1-43	0.0070	63.6	0.30	17	20.0	NORMAL	0.035	Residential 43,000 sq-ft lots
		0.0110	**100.0**						
26	DESERT	0.0020	33.3	0.35	0	25.0	DRY	0.071	Desert
	R1-18	0.0040	66.7	0.30	27	50.0	NORMAL	0.036	Residential 18,000 sq-ft lots
		0.0060	**100.0**						
30	DESERT	0.0070	53.8	0.35	0	25.0	DRY	0.067	Desert
	R1-18	0.0030	23.1	0.30	27	50.0	NORMAL	0.034	Residential 18,000 sq-ft lots
	R1-43	0.0030	23.1	0.30	17	20.0	NORMAL	0.034	Residential 43,000 sq-ft lots
		0.0130	**100.0**						
35	DESERT	0.0010	11.1	0.35	0	25.0	DRY	0.070	Desert
	R1-18	0.0080	88.9	0.30	35 *	50.0	NORMAL	0.070 *	Residential 18,000 sq-ft lots
		0.0090	**100.0**						
40	DESERT	0.0090	56.3	0.35	0	25.0	DRY	0.066	Desert
	R1-43	0.0040	25.0	0.30	17	20.0	NORMAL	0.034	Residential 43,000 sq-ft lots
	ROAD	0.0030	18.8	0.10	60	75.0	NORMAL	0.034	Local Roadway 40' Tract 24' BC

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: STORYROCK PH2 PROP

in	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
jor Basin ID: 01									
		0.0160	**100.1**						
141	DESERT	0.0010	20.0	0.35	0	25.0	DRY	0.073	Desert
	R1-18	0.0040	80.0	0.30	27	50.0	NORMAL	0.037	Residential 18,000 sq-ft lots
		0.0050	**100.0**						
145	DESERT	0.0030	60.0	0.35	0	25.0	DRY	0.073	Desert
	ROAD	0.0020	40.0	0.10	60	75.0	NORMAL	0.037	Local Roadway 40' Tract 24' BC
		0.0050	**100.0**						
150	DESERT	0.0020	22.2	0.35	0	25.0	DRY	0.070	Desert
	R1-35	0.0040	44.4	0.30	21	50.0	NORMAL	0.035	Residential 35,000 sq-ft lots
	R1-43	0.0030	33.3	0.30	17	20.0	NORMAL	0.035	Residential 43,000 sq-ft lots
		0.0090	**99.9**						
151	DESERT	0.0010	14.3	0.35	0	25.0	DRY	0.071	Desert
	R1-18	0.0060	85.7	0.30	27	50.0	NORMAL	0.036	Residential 18,000 sq-ft lots
		0.0070	**100.0**						
215	DESERT	0.0060	26.1	0.35	0	25.0	DRY	0.064	Desert
	R1-35	0.0120	52.2	0.30	21	50.0	NORMAL	0.033	Residential 35,000 sq-ft lots
	R1-43	0.0050	21.7	0.30	17	20.0	NORMAL	0.033	Residential 43,000 sq-ft lots
		0.0230	**100.0**						
216	DESERT	0.0010	12.5	0.35	0	25.0	DRY	0.070	Desert
	R1-35	0.0070	87.5	0.30	21	50.0	NORMAL	0.036	Residential 35,000 sq-ft lots

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: STORYROCK PH2 PROP

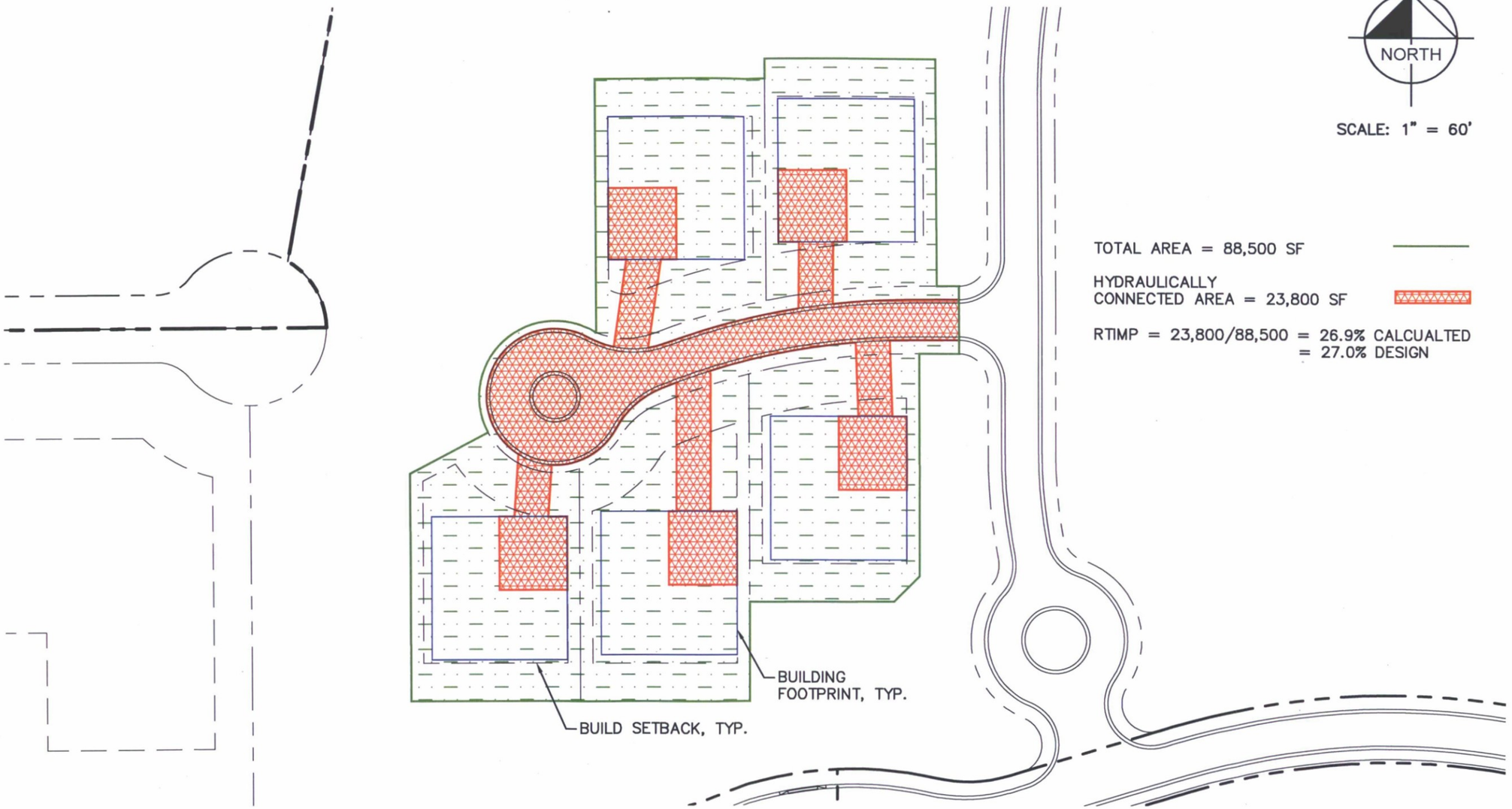
in	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
jor Basin ID: 01									
		0.0080	**100.0**						
220	DESERT	0.0030	100.0	0.35	0	25.0	DRY	0.076	Desert
		0.0030	**100.0**						
225	DESERT	0.0046	100.0	0.35	0	25.0	DRY	0.073	Desert
		0.0046	**100.0**						
230	DESERT	0.0010	14.3	0.35	0	25.0	DRY	0.071	Desert
	R1-43	0.0060	85.7	0.30	17	20.0	NORMAL	0.036	Residential 43,000 sq-ft lots
		0.0070	**100.0**						
235	DESERT	0.0002	20.0	0.35	0	25.0	DRY	0.083	Desert
	R1-43	0.0008	80.0	0.30	17	20.0	NORMAL	0.041	Residential 43,000 sq-ft lots
		0.0010	**100.0**						
305	DESERT	0.0220	100.0	0.35	0	25.0	DRY	0.064	Desert
		0.0220	**100.0**						

* Non default value

Project ***Storyrock***
Subject **Land Use Summary Table**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: Land Use Hec-1 Values

Land Use Code	Description	IA	RTIMP	Vegetation Cover
R1-18	Min Lot Size = 13,500 Sq Ft	0.30	27	50.0
R1-35	Min Lot Size = 26,2500 Sq Ft	0.30	21	50.0
R1-43	Min Lot Size = 32,250 Sq Ft	0.30	17	20.0
R1-70	Min Lot Size = 52,500 Sq Ft	0.30	14	20.0
Road	24' Roadway, 40' Tract/ROW	0.10	60	75.0
Natural Desert	Natural Desert	0.35	0	25.0



STORYROCK – R1–18 RTIMP DETERMINATION

Kimley»Horn

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
OFF100	645	61	64561	0.009	100.00	0.150	-	100	
OFF105	645	61	64561	0.084	100.00	0.150	-	100	
OFF110	645	61	64561	0.036	100.00	0.150	-	100	
OFF115	645	61	64561	0.005	100.00	0.150	-	100	
OFF120	645	61	64561	0.093	99.10	0.150	-	100	
	645	63	64563	0.001	0.90	0.140	25.00	100	
OFF125	645	61	64561	0.099	91.50	0.150	-	100	
	645	63	64563	0.009	8.50	0.140	25.00	100	
OFF80	645	61	64561	0.042	100.00	0.150	-	100	
OFF85	645	61	64561	0.001	100.00	0.150	-	100	
OFF90	645	61	64561	0.002	100.00	0.150	-	100	
OFF95	645	61	64561	0.063	100.00	0.150	-	100	
ON115	645	61	64561	0.007	100.00	0.150	-	100	
ON125	645	61	64561	0.011	100.00	0.150	-	100	
ON126	645	61	64561	0.007	100.00	0.150	-	100	
ON130	645	61	64561	0.013	100.00	0.150	-	100	
ON135	645	61	64561	0.009	100.00	0.150	-	100	
ON140	645	61	64561	0.016	100.00	0.150	-	100	
ON141	645	61	64561	0.005	100.00	0.150	-	100	
ON145	645	61	64561	0.005	100.00	0.150	-	100	
ON150	645	61	64561	0.009	100.00	0.150	-	100	
ON151	645	61	64561	0.007	100.00	0.150	-	100	
ON215	645	61	64561	0.023	100.00	0.150	-	100	
ON216	645	61	64561	0.008	100.00	0.150	-	100	
ON220	645	61	64561	0.003	100.00	0.150	-	100	
ON225	645	61	64561	0.005	100.00	0.150	-	100	
ON230	645	61	64561	0.007	100.00	0.150	-	100	
ON235	645	61	64561	0.001	100.00	0.150	-	100	
ON305	645	61	64561	0.022	100.00	0.150	-	100	

Engineering, Planning and Environmental Consultants
7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

NO.	REVISION	BY	DATE	APPR.

SCALE(H):1"= 1500'
SCALE(V): N/A
DESIGNED BY: MAW
DRAWN BY: DWT
CHECKED BY: MAW
DATE: AUGUST 2014

CAVALLIERE
EXISTING SOILS MAP

PROJECT NO.
191089013
DRAWING NAME
Existing_Soils.mxd

Flood Control District of Maricopa County
Drainage Design Management System
HEC-1 STORAGE FACILITIES

2/20/2017

Storage Basin ID:	**DB125**										
Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		-	-	-	0.1	0.1	0.2	0.2		
Spillway Length:	-NA-	**Discharge (cfs)**	0	4	8	12	16	18	20	36	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	1.0	2.0	3.0	4.0	5.0	6.0	6.0	-	-
Weir Coefficient:	-NA-											
Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											
Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr				
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.01	0.00	0.06	0.00	0.00	0.22				
Length of Dam:	-NA-	**Peak Stage (ft)**	2.00	0.00	4.00	0.00	0.00	6.00				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	8.00	0.00	16.00	0.00	0.00	36.00				
Weir Coefficient:	-NA-											

Storage Basin ID:	**DB126**										
Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		0.1	0.2	0.4	0.5	0.7	0.8	0.8		
Spillway Length:	-NA-	**Discharge (cfs)**	0	3	8	12	16	19	21	40	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	3.0	3.0	-	-
Weir Coefficient:	-NA-											
Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											
Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr				
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.22	0.00	0.44	0.00	0.00	0.81				
Length of Dam:	-NA-	**Peak Stage (ft)**	0.90	0.00	1.75	0.00	0.00	3.00				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	7.00	0.00	14.00	0.00	0.00	29.00				
Weir Coefficient:	-NA-											

Storage Basin ID:	**DB130**										
Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		-	0.1	0.1	0.2	0.2	0.2			
Spillway Length:	-NA-	**Discharge (cfs)**	0	2	3	7	11	17	20	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	3.0	-	-	-
Weir Coefficient:	-NA-											
Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											
Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr				
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.08	0.00	0.14	0.00	0.00	0.24				
Length of Dam:	-NA-	**Peak Stage (ft)**	1.00	0.00	1.75	0.00	0.00	3.00				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	3.00	0.00	9.00	0.00	0.00	20.00				
Weir Coefficient:	-NA-											

Storage Basin ID:	**DB135**										
Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		0.1	0.2	0.3	0.4	0.5	0.6	0.6		
Spillway Length:	-NA-	**Discharge (cfs)**	0	1	2	2	3	3	4	15	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	3.0	3.1	-	-
Weir Coefficient:	-NA-											
Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											
Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr				
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.16	0.00	0.36	0.00	0.00	0.59				
Length of Dam:	-NA-	**Peak Stage (ft)**	1.00	0.00	2.00	0.00	0.00	3.06				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	2.00	0.00	3.00	0.00	0.00	11.00				
Weir Coefficient:	-NA-											

Storage Basin ID:	**DB150**										
Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		0.1	0.2	0.3	0.4	0.6	0.8			
Spillway Length:	-NA-	**Discharge (cfs)**	0	1	3	4	5	6	7	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	3.0	-	-	-
Weir Coefficient:	-NA-											
Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											
Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr				
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.13	0.00	0.30	0.00	0.00	0.60				
Length of Dam:	-NA-	**Peak Stage (ft)**	0.75	0.00	1.50	0.00	0.00	2.50				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	2.00	0.00	4.00	0.00	0.00	6.00				
Weir Coefficient:	-NA-											

Storage Basin ID:	**DB151**										
Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		0.1	0.1	0.2	0.3	0.4	0.5	0.5		
Spillway Length:	-NA-	**Discharge (cfs)**	0	1	2	2	3	4	5	15	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	3.0	3.0	-	-
Weir Coefficient:	-NA-											
Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											
Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr				
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.14	0.00	0.40	0.00	0.00	0.51				
Length of Dam:	-NA-	**Peak Stage (ft)**	1.00	0.00	2.50	0.00	0.00	3.10				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	2.00	0.00	4.00	0.00	0.00	15.00				
Weir Coefficient:	-NA-											

Flood Control District of Maricopa County
Drainage Design Management System
HEC-1 STORAGE FACILITIES

Storage Basin ID:	**DB225**										
Spillway Characteristics (SS)			1	2	3	4	5	6	7	8	9	10
Spillway Crest Elevation:	-NA-	**Volume (ac-ft)**		0.1	0.2	0.2	0.3	0.4	0.5			
Spillway Length:	-NA-	**Discharge (cfs)**	0	1	2	3	4	5	6	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	3.0	-	-	-
Weir Coefficient:	-NA-											
Low-Level Outlet (SL)			11	12	13	14.	15	16	17	18	19	20
Centerline Elevation:	-NA-	**Volume (ac-ft)**	-	-	-	-	-	-	-	-	-	-
Cross-Section Area:	-NA-	**Discharge (cfs)**	0	0	0	0	0	0	0	0	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	-	-	-	-	-	-	-	-	-
Orifice Equation Exponent:	-NA-											
Top of Dam Overflow (ST)			2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr				
Elevation Top of Dam:	-NA-	**Peak Volume (ac-ft)**	0.07	0.00	0.15	0.00	0.00	0.32				
Length of Dam:	-NA-	**Peak Stage (ft)**	0.50	0.00	1.00	0.00	0.00	2.00				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	1.00	0.00	2.00	0.00	0.00	4.00				
Weir Coefficient:	-NA-											

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Project ***Storyrock Phase 2***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: to determine the storage-flow relationship for small detention basins

DB125 ***Drains in 0.06 hours***

Outlet Diameter 1.50 ft
Outlet Elevation 0 ft
Outlet X-Sect Area 1.767 ft^2
No. of Outlet Barrels 1
Outlet Pipe Slope 0.005 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	45	0.00				0		0	0	0
			0.00	1.0	0.00		0.02			
1	228	0.01				0.00		4	0	4
			0.01	1.0	0.01		0.02			
2	530	0.01				0.01		8	0	8
			0.02	1.0	0.02		0.02			
3	1,066	0.02				0.03		12	0	12
			0.03	1.0	0.03		0.03			
4	1,858	0.04				0.06		16	0	16
			0.06	1.0	0.06		0.04			
5	3,280	0.08				0.12		18	0	18
			0.09	1.0	0.09		0.04			
6	4,952	0.11				0.22		20	16	36

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

Kimley»Horn

Project ***Storyrock Phase 2***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: to determine the storage-flow relationship for small detention basins

DB126 ***Drains in 1.13 hours***

Outlet Diameter 2.00 ft
Outlet Elevation 0 ft
Outlet X-Sect Area 3.142 ft^2
No. of Outlet Barrels 1
Outlet Pipe Slope 0.005 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	8,826	0.20				0		0	0	0
			0.24	1.0	0.24		0.72			
1	11,894	0.27				0.24		8	0	8
			0.28	1.0	0.28		0.28			
2	12,256	0.28				0.52		16	0	16
			0.31	1.0	0.31		0.13			
3	14,987	0.34				0.83		21	19	40

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

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Project ***Storyrock Phase 2***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: to determine the storage-flow relationship for small detention basins

DB130 ***Drains in 0.78 hours***

Outlet Diameter 1.00 ft
Outlet Elevation 0 ft
Outlet X-Sect Area 0.785 ft^2
No. of Outlet Barrels 1
Outlet Pipe Slope 0.005 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	1,985	0.05				0		0	0	0
			0.06	1.0	0.06		0.55			
1	2,986	0.07				0.06		3	0	3
			0.08	1.0	0.08		0.15			
2	4,026	0.09				0.14		5	6	11
			0.11	1.0	0.11		0.08			
3	5,133	0.12				0.24		6	14	20

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

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Project ***Storyrock Phase 2***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: to determine the storage-flow relationship for small detention basins

DB135 ***Drains in 3.48 hours***

Outlet Diameter 0.80 ft
Outlet Elevation 0 ft
Outlet X-Sect Area 0.503 ft^2
No. of Outlet Barrels 1
Outlet Pipe Slope 0.005 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	6,450	0.15				0		0	0	0
			0.16	1.0	0.16		2.11			
1	7,823	0.18				0.16		2	0	2
			0.20	1.0	0.20		0.96			
2	9,297	0.21				0.36		3	0	3
			0.23	1.0	0.23		0.40			
3	10,872	0.25				0.59		4	7	11

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

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Project ***Storyrock Phase 2***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: to determine the storage-flow relationship for small detention basins

DB150 ***Drains in 3.29 hours***

Outlet Diameter 1.00 ft
Outlet Elevation 0 ft
Outlet X-Sect Area 0.785 ft^2
No. of Outlet Barrels 1
Outlet Pipe Slope 0.005 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	6,593	0.15				0		0	0	0
			0.18	1.0	0.18		1.76			
1	9,414	0.22				0.18		3	0	3
			0.25	1.0	0.25		0.85			
2	12,486	0.29				0.44		5	0	5
			0.32	1.0	0.32		0.68			
3	15,765	0.36				0.76		7	0	7

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

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Project ***Storyrock Phase 2***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: to determine the storage-flow relationship for small detention basins

DB151 ***Drains in 3.17 hours***

Outlet Diameter 0.75 ft
Outlet Elevation 0 ft
Outlet X-Sect Area 0.442 ft^2
No. of Outlet Barrels 1
Outlet Pipe Slope 0.005 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	5,297	0.12				0		0	0	0
			0.14	1.0	0.14		1.97			
1	6,605	0.15				0.14		2	0	2
			0.17	1.0	0.17		0.93			
2	8,043	0.18				0.30		3	0	3
			0.20	1.0	0.20		0.28			
3	9,613	0.22				0.51		5	10	15

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

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Project ***Storyrock Phase 2***
Subject **Detention Basin Calculations**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: to determine the storage-flow relationship for small detention basins

DB225 ***Drains in 3.34 hours***

Outlet Diameter	0.75 ft	Outlet X-Sect Area	0.442 ft^2
Outlet Elevation	0 ft	No. of Outlet Barrels	1
		Outlet Pipe Slope	0.005 ft/ft

Elevation [ft]	Surface Storage Area [ft^2]	Surface Storage Area [acre]	Average Area [acre]	Δ Elev [ft]	Δ Vol [ac-ft]	Σ Vol [ac-ft]	Δ Time to Drain [hr]	Q_{pipe} [cfs]	Q_{weir} [cfs]	Total Q_{out} [cfs]
0	5,685	0.13				0		0	0	0
			0.15	1.0	0.15		2.09			
1	6,962	0.16				0.15		2	0	2
			0.18	1.0	0.18		0.97			
2	8,341	0.19				0.32		3	0	3
			0.21	1.0	0.21		0.29			
3	9,822	0.23				0.53		5	10	15

Notes:
Q_{pipe} goes from Mannings Eqn to Orifice Eqn when water surface exceeds 1.2*(Outlet Diameter)
per Linsley et al. *Water Resources Engineering* 4th Edition, pg 652.

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Project ***Storyrock Phase 2***
Subject **Basin Summary Table**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: Basin Summary Table

Basin ID	Volume (ac-ft)	Max Depth (ft)	Max Side Slope (ft, H:V)	100 Yr Peak Inflow Rate (cfs)	100 Yr Peak Outflow Rate (cfs)	100 Yr Peak Flow Attenuation (cfs)	Orifice Size (ft)	Drain Time (hr)	Type	2 Year Storage Volume (ac-ft)	10 Year Storage Volume (ac-ft)	100 Year Storage Volume (ac-ft)
DB125	0.22	6.00	*	36	36	0	1.50	0.06	In-line	0.01	0.06	0.22
DB126	0.83	3.00	4:1	46	40	6	2.00	1.13	Standard	0.22	0.44	0.81
DB130	0.24	3.00	4:1	24	20	4	1.00	0.78	Standard	0.08	0.14	0.24
DB135	0.59	3.00	4:1	21	11	10	0.80	3.48	Standard	0.16	0.36	0.59
DB150	0.76	3.00	4:1	24	6	18	1.00	3.29	Standard	0.13	0.30	0.60
DB151	0.51	3.00	4:1	25	15	10	0.75	3.17	Standard	0.14	0.40	0.51
DB225	0.53	3.00	4:1	12	4	8	0.75	3.34	Standard	0.07	0.15	0.32

Kimley»Horn

Project ***Storyrock Phase 2***
Subject **First Flush Summary**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: First Flush Suammry

First Flush Volume = A*C*P/12

Contributing Sub Basin	First Flush Method	Contributing Developed Area (sf)	Contributing Developed Area (ac)	First Flush Volume Req. (ac-ft)	Basin Volume Prov. (ac-ft)
ON115	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON125	Basin	99,684	2.29	0.09	0.22
ON126	Basin	182,327	4.19	0.17	0.83
ON130	Basin	186,957	4.29	0.17	0.24
ON135	Basin	242,286	5.56	0.22	0.59
ON140	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON141	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON145	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON150	Basin	247,619	5.68	0.23	0.76
ON151	Basin	199,023	4.57	0.18	0.51
ON215	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON216	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON230	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON235	NA*	N/A	N/A	N/A	N/A

Note* ge of lot drainage only. No first flush required.

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
NORMAL DEPTH															
Major Basin 01															
RO115	0.050	0.035	0.050	540.00	0.0260	-	X:	-	12.00	18.00	18.50	19.00	27.00	29.00	34.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO125A	0.050	0.035	0.050	525.00	0.0400	-	X:	-	6.00	13.00	16.00	16.10	19.00	22.00	28.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO125B	0.050	0.035	0.050	877.00	0.0400	-	X:	-	6.00	8.00	11.00	11.20	13.00	19.00	27.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO125C	0.050	0.035	0.050	720.00	0.0280	-	X:	-	8.00	14.00	19.00	19.10	26.00	29.00	34.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO140A	0.050	0.035	0.050	333.00	0.0270	-	X:	-	27.00	30.00	34.00	34.20	40.00	47.00	82.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO140B	0.050	0.035	0.050	626.00	0.0340	-	X:	-	7.00	8.00	11.00	11.20	14.00	16.00	31.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO140C	0.050	0.035	0.050	1,210.00	0.0320	-	X:	-	3.00	6.00	11.00	11.20	17.00	23.00	48.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO215A	0.050	0.035	0.050	975.00	0.0360	-	X:	-	9.00	21.00	25.00	32.00	36.00	70.00	90.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO215B	0.050	0.035	0.050	800.00	0.0340	-	X:	-	6.00	10.00	13.00	19.00	21.00	26.00	62.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO215C	0.050	0.035	0.050	445.00	0.0340	-	X:	-	12.00	28.00	36.00	48.00	71.00	73.00	76.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO215D	0.050	0.035	0.050	364.00	0.0300	-	X:	-	5.00	8.00	11.00	11.10	14.00	17.00	24.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
RO220	0.050	0.035	0.050	310.00	0.0420	-	X:	-	8.00	15.00	21.00	21.10	25.00	30.00	36.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO230A	0.013	0.013	0.013	800.00	0.0325	-	X:	-	8.00	10.00	20.00	30.00	32.00	40.00	41.00
							Y:	2.20	2.10	1.80	2.00	1.80	2.10	2.20	2.21
RO230B	0.050	0.035	0.050	270.00	0.0480	-	X:	-	9.00	42.00	45.00	118.00	122.00	127.00	132.00
							Y:	3.00	3.00	3.00	-	-	1.00	2.00	3.00
RO305A	0.050	0.035	0.050	685.00	0.0480	-	X:	-	10.00	21.00	30.00	43.00	61.00	68.00	75.00
							Y:	3.00	2.00	1.00	-	-	1.00	-	1.00
RO305B	0.050	0.035	0.050	970.00	0.0480	-	X:	-	6.00	8.00	20.00	32.00	43.00	51.00	66.00
							Y:	3.00	2.00	1.00	-	-	1.00	1.50	2.00
RO305C	0.050	0.035	0.050	653.00	0.0430	-	X:	-	10.00	15.00	26.00	43.00	155.00	165.00	169.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1)    *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   12FEB17  TIME  16:36:55   *
*                                       *
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*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
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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
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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

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

  1           ID        Flood Control District of Maricopa County
  2           ID        STORYROCK PH2 PROP - STORYROCK PHASE 2 PROP CONDITION
  3           ID        2 YEAR
  4           ID        6 Hour  Storm
  5           ID        Unit Hydrograph: Clark
  6           ID        Storm: Multiple
  7           ID        02/12/2017
              *DIAGRAM
  8           IT      5  1JAN99       0    2000
  9           IO      5
 10           IN     15
              *
 11           JD  1.419  0.0001
 12           PC  0.000   0.008  0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
 13           PC  0.087   0.099  0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
 14           PC  0.962   0.972  0.983   0.991   1.000
 15           JD  1.410  0.5000
 16           PC  0.000   0.008  0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
 17           PC  0.087   0.099  0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
 18           PC  0.962   0.972  0.983   0.991   1.000
 19           JD  1.384     2.8
 20           PC  0.000   0.009  0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
 21           PC  0.087   0.100  0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
 22           PC  0.950   0.963  0.975   0.988   1.000
              *

 23           KK  OFF80   BASIN
 24           BA  0.042
 25           LG   0.35    0.40   6.00    0.18       0
 26           UC  0.503   0.690
 27           UA      0     3.0    5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 28           UA    100
              *

 29           KK  RO115   ROUTE
 30           RS      1    FLOW
 31           RC  0.050   0.035  0.050     540  0.0260    0.00
 32           RX   0.00   12.00  18.00   18.50   19.00   27.00   29.00   34.00
 33           RY   3.00    2.00   1.00    0.00    0.00    1.00    2.00    3.00
              *
```

```
          34          KK   ON115   BASIN
          35          BA   0.007
          36          LG    0.26    0.29    6.00    0.20      26
          37          UC   0.302   0.698
          38          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          39          UA     100
                      *

          40          KK   CO115 COMBINE
          41          HC       2
                      *
1                                          HEC-1 INPUT                                          PAGE  2

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

          42          KK   OFF85   BASIN
          43          BA   0.001
          44          LG    0.35    0.40    6.00    0.18       0
          45          UC   0.166   0.273
          46          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          47          UA     100
                      *

          48          KK  RO125A   ROUTE
          49          RS       1    FLOW
          50          RC   0.050   0.035   0.050     525  0.0400    0.00
          51          RX    0.00    6.00   13.00   16.00   16.10   19.00   22.00   28.00
          52          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                      *

          53          KK   OFF90   BASIN
          54          BA   0.002
          55          LG    0.35    0.40    6.00    0.18       0
          56          UC   0.149   0.141
          57          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          58          UA     100
                      *

          59          KK  RO125B   ROUTE
          60          RS       1    FLOW
          61          RC   0.050   0.035   0.050     877  0.0400    0.00
          62          RX    0.00    6.00    8.00   11.00   11.20   13.00   19.00   27.00
          63          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                      *

          64          KK   ON125   BASIN
          65          BA   0.011
          66          LG    0.32    0.30    6.00    0.17      11
          67          UC   0.205   0.211
          68          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          69          UA     100
                      *

          70          KK   CO125 COMBINE
          71          HC       3
                      *

          72          KK   DB125 STORAGE
          73          KO
          74          RS       1    STOR
          75          SV            0.01    0.01    0.03    0.06    0.12    0.22    0.22
          76          SQ            4.00    8.00   12.00   16.00   18.00   20.00   49.00
          77          SE            1.00    2.00    3.00    4.00    5.00    6.00    6.02
                      *
1                                          HEC-1 INPUT                                          PAGE  3

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

          78          KK  RO125C   ROUTE
          79          RS       1    FLOW
          80          RC   0.050   0.035   0.050     720  0.0280    0.00
          81          RX    0.00    8.00   14.00   19.00   19.10   26.00   29.00   34.00
          82          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                      *

          83          KK   ON126   BASIN
```

```
 85          LG   0.32    0.30    6.00    0.20      18
 86          UC  0.203   0.246
 87          UA      0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 88          UA    100
             *

 89          KK   CO126 COMBINE
 90          HC       2
             *

 91          KK   DB126 STORAGE
 92          KO
 93          RS       1    STOR
 94          SV            0.12    0.24    0.35    0.52    0.66    0.81    0.83
 95          SQ            3.00    8.00   12.00   16.00   19.00   21.00   40.00
 96          SE            0.50    1.00    1.50    2.00    2.50    2.95    3.00
             *

 97          KK   ON130   BASIN
 98          BA   0.013
 99          LG   0.33    0.33    6.00    0.18      10
100          UC  0.308   0.478
101          UA      0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
102          UA    100
             *

103          KK   DB130 STORAGE
104          KO
105          RS       1    STOR
106          SV            0.04    0.08    0.12    0.16    0.20    0.24
107          SQ            2.00    3.00    7.00   11.00   17.00   20.00
108          SE            0.50    1.00    1.50    2.00    2.50    3.00
             *

109          KK   ON135   BASIN
110          BA   0.009
111          LG   0.31    0.27    6.00    0.21      31
112          UC  0.262   0.325
113          UA      0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
114          UA    100
             *
```



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

115          KK   DB135 STORAGE
116          KO
117          RS       1    STOR
118          SV            0.08    0.16    0.26    0.36    0.48    0.59    0.59
119          SQ            1.00    2.00    2.00    3.00    3.00    4.00   15.00
120          SE            0.50    1.00    1.50    2.00    2.50    3.00    3.05
             *

121          KK   OFF95   BASIN
122          BA   0.063
123          LG   0.35    0.40    6.00    0.18       0
124          UC  0.545   0.717
125          UA      0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
126          UA    100
             *

127          KK  RO140A   ROUTE
128          RS       1    FLOW
129          RC  0.050   0.035   0.050     333  0.0270    0.00
130          RX   0.00   27.00   30.00   34.00   34.20   40.00   47.00   82.00
131          RY   3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

132          KK  OFF100   BASIN
133          BA   0.009
134          LG   0.35    0.40    6.00    0.18       0
135          UC  0.315   0.464
136          UA      0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
137          UA    100
             *

138          KK  RO140B   ROUTE
```

```
    140          RC   0.050   0.035   0.050     626  0.0340    0.00
    141          RX    0.00    7.00    8.00   11.00   11.20   14.00   16.00   31.00
    142          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                 *

    143          KK  CO140A COMBINE
    144          HC       2
                 *

    145          KK  RO140C   ROUTE
    146          RS       1    FLOW
    147          RC   0.050   0.035   0.050    1210  0.0320    0.00
    148          RX    0.00    3.00    6.00   11.00   11.20   17.00   23.00   48.00
    149          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                 *
1                                         HEC-1 INPUT                                         PAGE  5

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


    150          KK   ON140   BASIN
    151          BA   0.016
    152          LG    0.29    0.33    6.00    0.19      16
    153          UC   0.406   0.838
    154          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
    155          UA     100
                 *

    156          KK   ON141   BASIN
    157          BA   0.005
    158          LG    0.31    0.28    6.00    0.21      22
    159          UC   0.179   0.178
    160          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
    161          UA     100
                 *

    162          KK  CO140B COMBINE
    163          HC       3
                 *

    164          KK   ON145   BASIN
    165          BA   0.005
    166          LG    0.25    0.34    6.00    0.21      24
    167          UC   0.226   0.369
    168          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
    169          UA     100
                 *

    170          KK    CEX1 COMBINE
    171          HC       5
                 *

    172          KK   ON150   BASIN
    173          BA   0.009
    174          LG    0.31    0.28    6.00    0.19      15
    175          UC   0.193   0.191
    176          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
    177          UA     100
                 *

    178          KK   DB150 STORAGE
    179          KO
    180          RS       1    STOR
    181          SV            0.08    0.18    0.30    0.44    0.60    0.76
    182          SQ            1.00    3.00    4.00    5.00    6.00    7.00
    183          SE            0.50    1.00    1.50    2.00    2.50    3.00
                 *

    184          KK   RO151   ROUTE
    185          RK     590  0.0370   0.013            CIRC   2.000
                 *
1                                         HEC-1 INPUT                                         PAGE  6

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


    186          KK   ON151   BASIN
    187          BA   0.007
```

```
189          UC   0.162   0.153
190          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
191          UA     100
             *

192          KK   CO151 COMBINE
193          HC       2
             *

194          KK   DB151 STORAGE
195          KO
196          RS       1    STOR
197          SV            0.07    0.14    0.22    0.30    0.40    0.51    0.51
198          SQ            1.00    2.00    2.00    3.00    4.00    5.00   15.00
199          SE            0.50    1.00    1.50    2.00    2.50    3.00    3.05
             *

200          KK  OFF105   BASIN
201          BA   0.084
202          LG    0.35    0.40    6.00    0.18       0
203          UC   0.538   0.683
204          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
205          UA     100
             *

206          KK  RO215A   ROUTE
207          RS       1    FLOW
208          RC   0.050   0.035   0.050     975  0.0360    0.00
209          RX    0.00    9.00   21.00   25.00   32.00   36.00   70.00   90.00
210          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

211          KK  OFF110   BASIN
212          BA   0.036
213          LG    0.35    0.40    6.00    0.18       0
214          UC   0.428   0.604
215          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
216          UA     100
             *

217          KK  OFF115   BASIN
218          BA   0.005
219          LG    0.35    0.40    6.00    0.18       0
220          UC   0.230   0.290
221          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
222          UA     100
             *
```



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

223          KK   RO220   ROUTE
224          RS       1    FLOW
225          RC   0.050   0.035   0.050     310  0.0420    0.00
226          RX    0.00    8.00   15.00   21.00   21.10   25.00   30.00   36.00
227          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

228          KK  ON220   BASIN
229          BA   0.003
230          LG    0.35    0.40    6.00    0.18       0
231          UC   0.222   0.326
232          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
233          UA     100
             *

234          KK   CO220 COMBINE
235          HC       2
             *

236          KK  RO215D   ROUTE
237          RS       1    FLOW
238          RC   0.050   0.035   0.050     364  0.0300    0.00
239          RX    0.00    5.00    8.00   11.00   11.10   14.00   17.00   24.00
240          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
```

```
242          HC       2
             *

243          KK  RO215B   ROUTE
244          RS       1    FLOW
245          RC   0.050   0.035   0.050     800  0.0340    0.00
246          RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
247          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

248          KK  CO215B COMBINE
249          HC       2
             *

250          KK  RO215C   ROUTE
251          RS       1    FLOW
252          RC   0.050   0.035   0.050     445  0.0340    0.00
253          RX    0.00   12.00   28.00   36.00   48.00   71.00   73.00   76.00
254          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

255          KK   ON215   BASIN
256          BA   0.023
257          LG    0.31    0.29    6.00    0.20      15
258          UC   0.349   0.576
259          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
260          UA     100
             *
1                                        HEC-1 INPUT                                    PAGE  8

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

261          KK   ON216   BASIN
262          BA   0.008
263          LG    0.31    0.27    6.00    0.21      18
264          UC   0.216   0.245
265          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
266          UA     100
             *

267          KK  CO215C COMBINE
268          HC       3
             *

269          KK   ON235   BASIN
270          BA   0.001
271          LG    0.31    0.28    6.00    0.17      14
272          UC   0.045   0.015
273          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
274          UA     100
             *

275          KK  OFF120   BASIN
276          BA   0.094
277          LG    0.35    0.40    6.00    0.18       0
278          UC   0.572   0.838
279          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
280          UA     100
             *

281          KK  RO305A   ROUTE
282          RS       1    FLOW
283          RC   0.050   0.035   0.050     685  0.0480    0.00
284          RX    0.00   10.00   21.00   30.00   43.00   61.00   68.00   75.00
285          RY    3.00    2.00    1.00    0.00    0.00    1.00    0.00    1.00
             *

286          KK  OFF125   BASIN
287          BA   0.108
288          LG    0.35    0.40    6.00    0.18       2
289          UC   0.594   0.887
290          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
291          UA     100
             *

292          KK  RO305B   ROUTE
293          RS       1    FLOW
```

```
295          RX    0.00    6.00    8.00   20.00   32.00   43.00   51.00   66.00
296          RY    3.00    2.00    1.00    0.00    0.00    1.00    1.50    2.00
             *
1                                    HEC-1 INPUT                                 PAGE  9

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

297          KK  CO305A COMBINE
298          HC       2
             *

299          KK  RO305C   ROUTE
300          RS       1    FLOW
301          RC   0.050   0.035   0.050     653  0.0430    0.00
302          RX    0.00   10.00   15.00   26.00   43.00  155.00  165.00  169.00
303          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

304          KK   ON305   BASIN
305          BA   0.022
306          LG    0.35    0.40    6.00    0.18       0
307          UC   0.356   0.426
308          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
309          UA     100
             *

310          KK  CO305B COMBINE
311          HC       2
             *

312          KK  RO230B   ROUTE
313          RS       1    FLOW
314          RC   0.050   0.035   0.050     270  0.0480    0.00
315          RX    0.00    9.00   42.00   45.00  118.00  122.00  127.00  132.00
316          RY    3.00    3.00    3.00    0.00    0.00    1.00    2.00    3.00
             *

317          KK   ON225   BASIN
318          BA   0.005
319          LG    0.35    0.40    6.00    0.18       0
320          UC   0.232   0.275
321          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
322          UA     100
             *

323          KK   DB225 STORAGE
324          KO
325          RS       1    STOR
326          SV            0.07    0.15    0.21    0.32    0.42    0.53
327          SQ            1.00    2.00    3.00    4.00    5.00    6.00
328          SE            0.50    1.00    1.50    2.00    2.50    3.00
             *

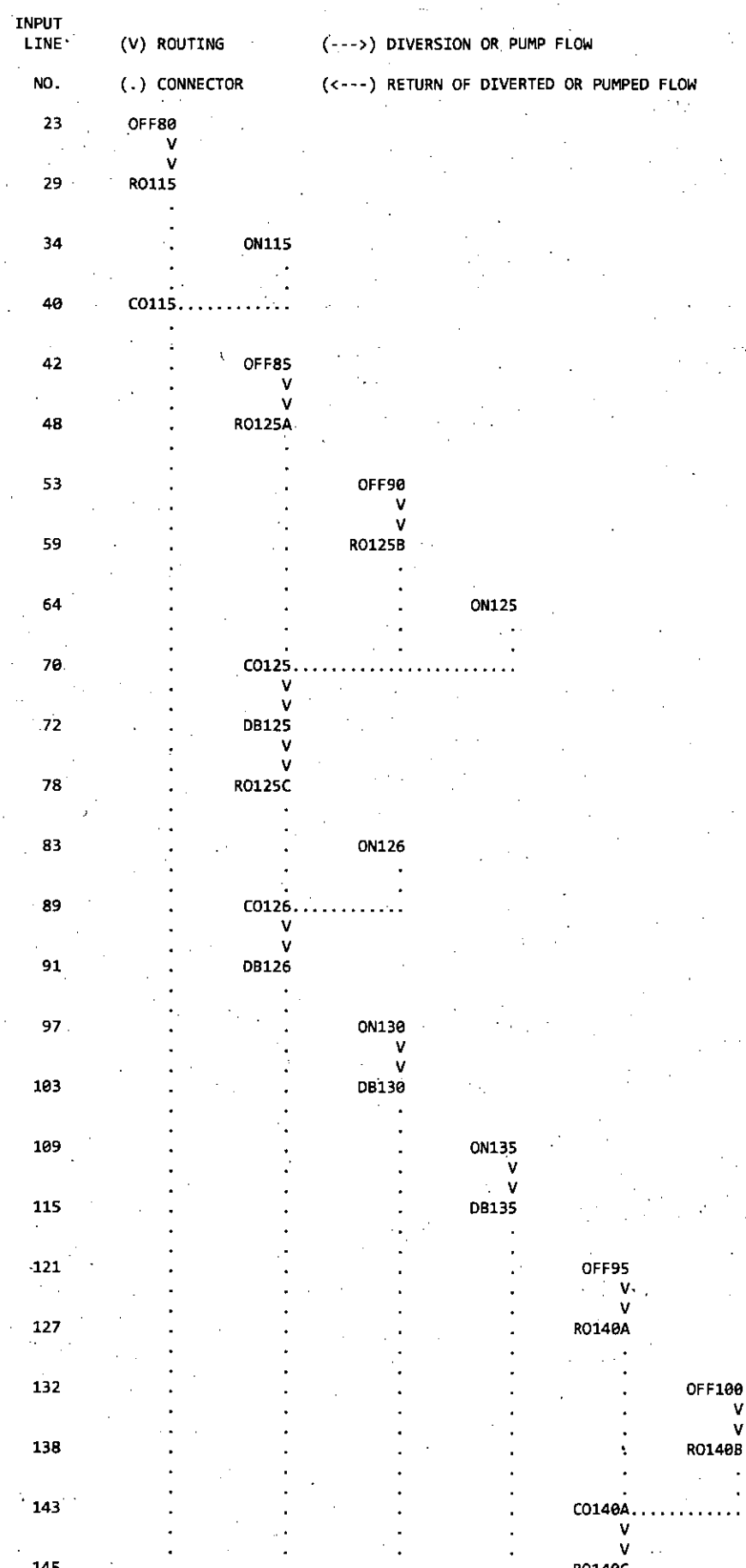
329          KK  RO230A   ROUTE
330          RS       1    FLOW
331          RC   0.013   0.013   0.013     800  0.0325    0.00
332          RX    0.00    8.00   10.00   20.00   30.00   32.00   40.00   41.00
333          RY    2.20    2.10    1.80    2.00    1.80    2.10    2.20    2.21
             *
1                                    HEC-1 INPUT                                 PAGE 10

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

334          KK   ON230   BASIN
335          BA   0.007
336          LG    0.31    0.27    6.00    0.17      15
337          UC   0.183   0.219
338          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
339          UA     100
             *

340          KK   CO230 COMBINE
341          HC       3
             *

342          ZZ
```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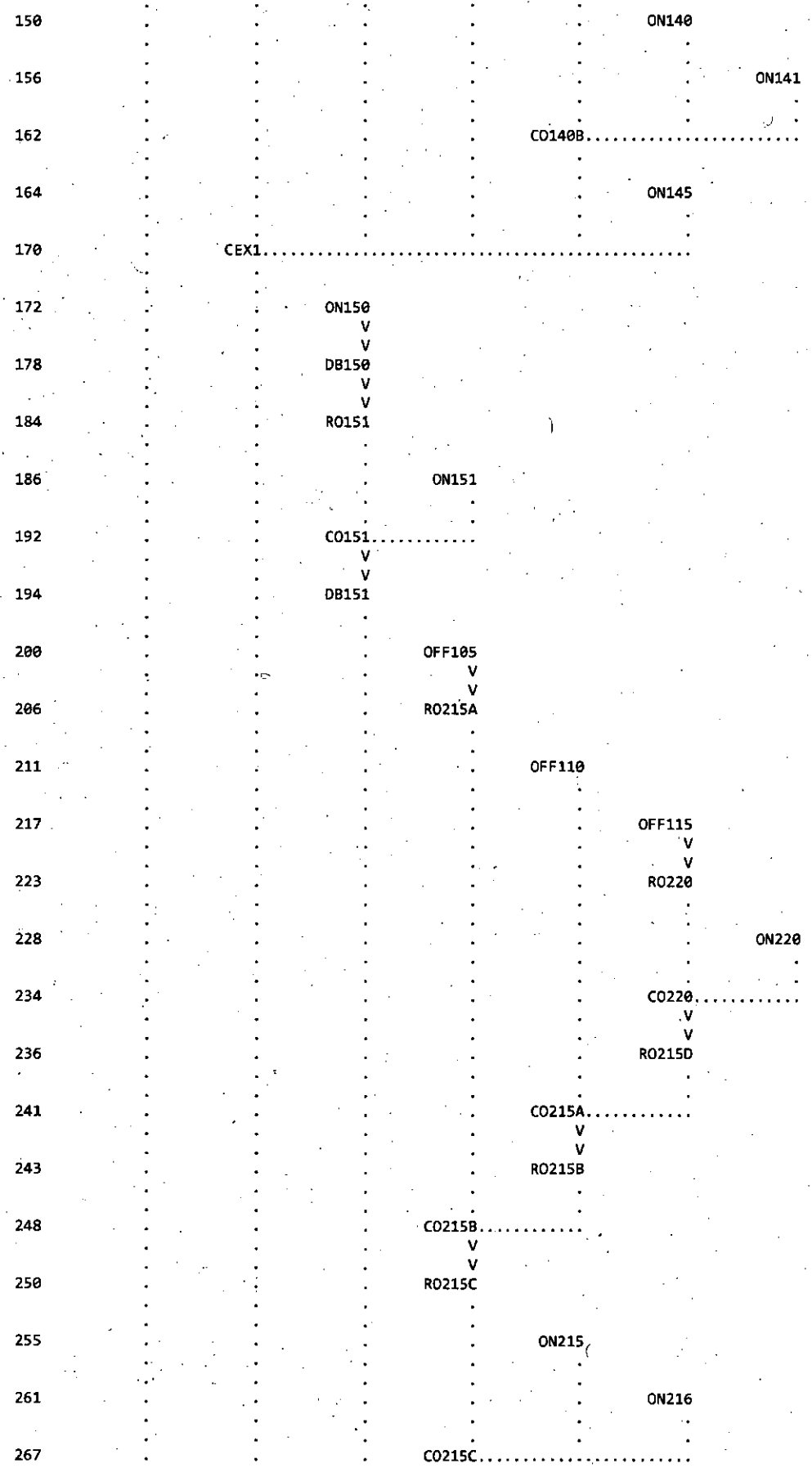
LINE
(V) ROUTING
(---->) DIVERSION OR PUMP FLOW
NO.
(.) CONNECTOR
(<----) RETURN OF DIVERTED OR PUMPED FLOW
23
OFF80
29
RO115
34
ON115
40
CO115
42
OFF85
48
RO125A
53
OFF90
59
RO125B
64
ON125
70
CO125
72
DB125
78
RO125C
83
ON126
89
CO126
91
DB126
97
ON130
103
DB130
109
ON135
115
DB135
121
OFF95
127
RO140A
132
OFF100
138
RO140B
143
CO140A
145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ON140
156
ON141
162
CO140B
164
ON145
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CEX1
172
ON150
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DB150
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RO151
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ON151
192
CO151
194
DB151
200
OFF105
206
RO215A
211
OFF110
217
OFF115
223
RO220
228
ON220
234
CO220
236
RO215D
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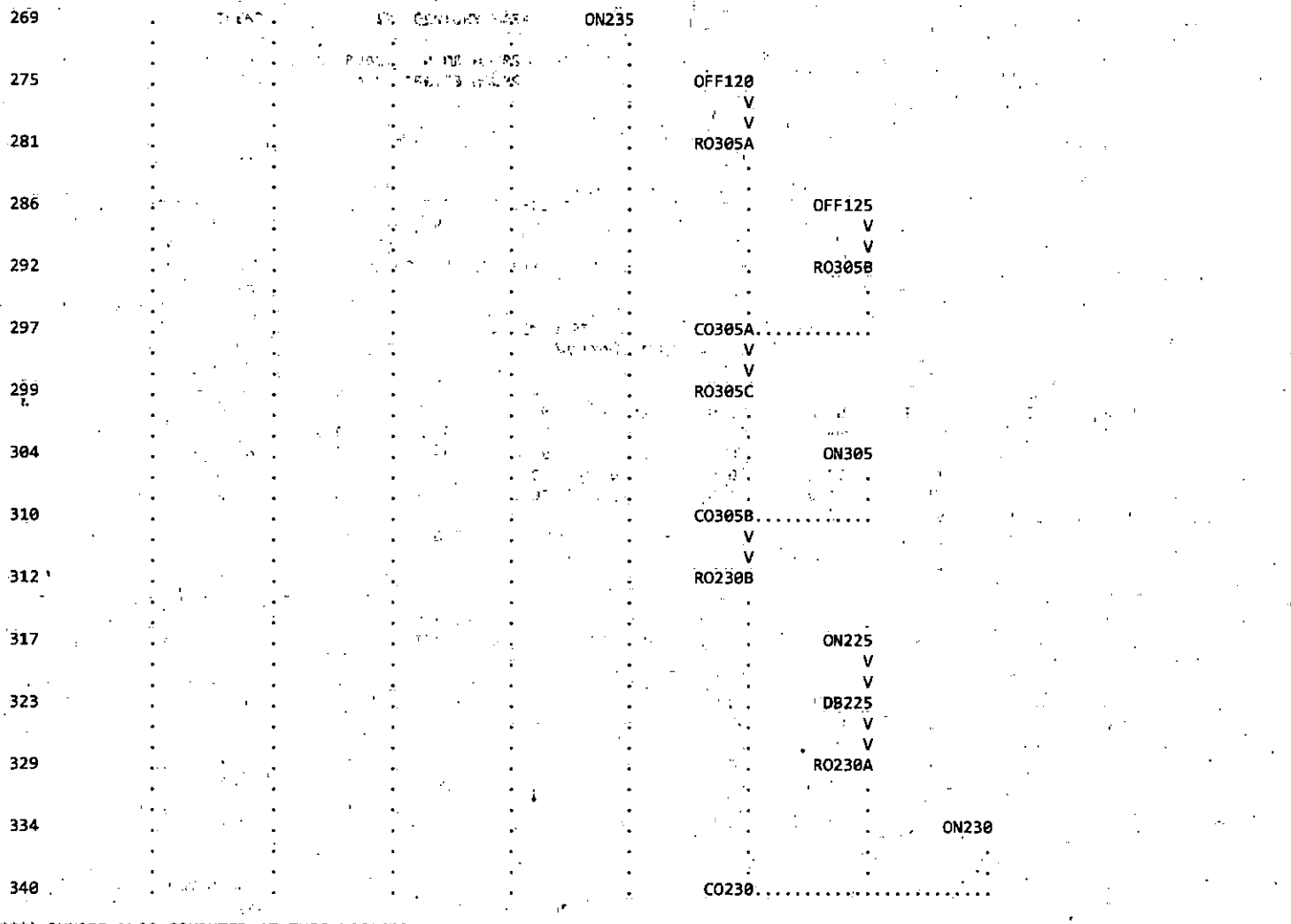
CO215A
243
RO215B
248
CO215B
250
RO215C
255
ON215
261
ON216
267
CO215C



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   12FEB17  TIME  16:36:55   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*      DAVIS, CALIFORNIA 95616          *
*          (916) 756-1104               *
*                                       *
*****************************************
```

Flood Control District of Maricopa County
STORYROCK PH2 PROP - STORYROCK PHASE 2 PROP CONDITION
2 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
02/12/2017

9 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	5	MINUTES IN COMPUTATION INTERVAL
IDATE	1JAN99	STARTING DATE
ITIME	0000	STARTING TIME
NQ	2000	NUMBER OF HYDROGRAPH ORDINATES

FOR STORM = 3 STORM AREA (SQ MI) = 2.80

RO151	MANE	0.45	0.94	270.76	0.31	5.00	0.94	270.00	0.31

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1509E+00 EXCESS=0.0000E+00 OUTFLOW=0.1509E+00 BASIN STORAGE=0.6213E-17 PERCENT ERROR= 0.0

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   12FEB17  TIME  16:37:02   *
*                                       *
*****************************************
```

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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (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        STORYROCK PH2 PROP - STORYROCK PHASE 2 PROP CONDITION
  3           ID        10 YEAR
  4           ID        6 Hour  Storm
  5           ID        Unit Hydrograph: Clark
  6           ID        Storm: Multiple
  7           ID        02/12/2017
              *DIAGRAM
  8           IT       5  1JAN99       0    2000
  9           IO       5
 10           IN      15
              *
 11           JD   2.105  0.0001
 12           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
 13           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
 14           PC   0.962   0.972   0.983   0.991   1.000
 15           JD   2.092  0.5000
 16           PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
 17           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
 18           PC   0.962   0.972   0.983   0.991   1.000
 19           JD   2.052     2.8
 20           PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
 21           PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
 22           PC   0.950   0.963   0.975   0.988   1.000
              *
 23           KK   OFF80   BASIN
 24           BA   0.042
 25           LG    0.35    0.40    6.00    0.18       0
 26           UC   0.418   0.562
 27           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 28           UA     100
              *
 29           KK   RO115   ROUTE
 30           RS       1    FLOW
 31           RC   0.050   0.035   0.050     540  0.0260    0.00
 32           RX    0.00   12.00   18.00   18.50   19.00   27.00   29.00   34.00
 33           RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *
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 34          KK   ON115   BASIN
 35          BA   0.007
 36          LG    0.26    0.29    6.00    0.20      26
 37          UC   0.263   0.599
 38          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 39          UA     100
             *

 40          KK   CO115 COMBINE
 41          HC       2
             *
1                                           HEC-1 INPUT                                             PAGE  2

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

 42          KK   OFF85   BASIN
 43          BA   0.001
 44          LG    0.35    0.40    6.00    0.18       0
 45          UC   0.138   0.222
 46          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 47          UA     100
             *

 48          KK  RO125A   ROUTE
 49          RS       1    FLOW
 50          RC   0.050   0.035   0.050     525  0.0400    0.00
 51          RX    0.00    6.00   13.00   16.00   16.10   19.00   22.00   28.00
 52          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 53          KK   OFF90   BASIN
 54          BA   0.002
 55          LG    0.35    0.40    6.00    0.18       0
 56          UC   0.124   0.114
 57          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 58          UA     100
             *

 59          KK  RO125B   ROUTE
 60          RS       1    FLOW
 61          RC   0.050   0.035   0.050     877  0.0400    0.00
 62          RX    0.00    6.00    8.00   11.00   11.20   13.00   19.00   27.00
 63          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 64          KK   ON125   BASIN
 65          BA   0.011
 66          LG    0.32    0.30    6.00    0.17      11
 67          UC   0.175   0.177
 68          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 69          UA     100
             *

 70          KK   CO125 COMBINE
 71          HC       3
             *

 72          KK   DB125 STORAGE
 73          KO
 74          RS       1    STOR
 75          SV            0.01    0.01    0.03    0.06    0.12    0.22    0.22
 76          SQ            4.00    8.00   12.00   16.00   18.00   20.00   49.00
 77          SE            1.00    2.00    3.00    4.00    5.00    6.00    6.02
             *
1                                           HEC-1 INPUT                                             PAGE  3

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

 78          KK  RO125C   ROUTE
 79          RS       1    FLOW
 80          RC   0.050   0.035   0.050     720  0.0280    0.00
 81          RX    0.00    8.00   14.00   19.00   19.10   26.00   29.00   34.00
 82          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 83          KK   ON126   BASIN
```

```
  85          LG    0.32    0.30    6.00    0.20      18
  86          UC   0.175   0.208
  87          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  88          UA     100
              *

  89          KK   CO126 COMBINE
  90          HC       2
              *

  91          KK   DB126 STORAGE
  92          KO
  93          RS       1    STOR
  94          SV            0.12    0.24    0.35    0.52    0.66    0.81    0.83
  95          SQ            3.00    8.00   12.00   16.00   19.00   21.00   40.00
  96          SE            0.50    1.00    1.50    2.00    2.50    2.95    3.00
              *

  97          KK   ON130   BASIN
  98          BA   0.013
  99          LG    0.33    0.33    6.00    0.18      10
 100          UC   0.262   0.400
 101          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 102          UA     100
              *

 103          KK   DB130 STORAGE
 104          KO
 105          RS       1    STOR
 106          SV            0.04    0.08    0.12    0.16    0.20    0.24
 107          SQ            2.00    3.00    7.00   11.00   17.00   20.00
 108          SE            0.50    1.00    1.50    2.00    2.50    3.00
              *

 109          KK   ON135   BASIN
 110          BA   0.009
 111          LG    0.31    0.27    6.00    0.21      31
 112          UC   0.229   0.280
 113          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 114          UA     100
              *
```



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

 115          KK   DB135 STORAGE
 116          KO
 117          RS       1    STOR
 118          SV            0.08    0.16    0.26    0.36    0.48    0.59    0.59
 119          SQ            1.00    2.00    2.00    3.00    3.00    4.00   15.00
 120          SE            0.50    1.00    1.50    2.00    2.50    3.00    3.05
              *

 121          KK   OFF95   BASIN
 122          BA   0.063
 123          LG    0.35    0.40    6.00    0.18       0
 124          UC   0.453   0.584
 125          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 126          UA     100
              *

 127          KK  RO140A   ROUTE
 128          RS       1    FLOW
 129          RC   0.050   0.035   0.050     333  0.0270    0.00
 130          RX    0.00   27.00   30.00   34.00   34.20   40.00   47.00   82.00
 131          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

 132          KK  OFF100   BASIN
 133          BA   0.009
 134          LG    0.35    0.40    6.00    0.18       0
 135          UC   0.262   0.378
 136          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 137          UA     100
              *

 138          KK  RO140B   ROUTE
```

```
 140          RC   0.050   0.035   0.050     626  0.0340    0.00
 141          RX    0.00    7.00    8.00   11.00   11.20   14.00   16.00   31.00
 142          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

 143          KK  CO140A COMBINE
 144          HC       2
              *

 145          KK  RO140C   ROUTE
 146          RS       1    FLOW
 147          RC   0.050   0.035   0.050    1210  0.0320    0.00
 148          RX    0.00    3.00    6.00   11.00   11.20   17.00   23.00   48.00
 149          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *
1                                      HEC-1 INPUT                                 PAGE  5

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

 150          KK   ON140   BASIN
 151          BA   0.016
 152          LG    0.29    0.33    6.00    0.19      16
 153          UC   0.349   0.709
 154          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 155          UA     100
              *

 156          KK   ON141   BASIN
 157          BA   0.005
 158          LG    0.31    0.28    6.00    0.21      22
 159          UC   0.155   0.152
 160          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 161          UA     100
              *

 162          KK  CO140B COMBINE
 163          HC       3
              *

 164          KK   ON145   BASIN
 165          BA   0.005
 166          LG    0.25    0.34    6.00    0.21      24
 167          UC   0.196   0.315
 168          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 169          UA     100
              *

 170          KK    CEX1 COMBINE
 171          HC       5
              *

 172          KK   ON150   BASIN
 173          BA   0.009
 174          LG    0.31    0.28    6.00    0.19      15
 175          UC   0.165   0.161
 176          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 177          UA     100
              *

 178          KK   DB150 STORAGE
 179          KO
 180          RS       1    STOR
 181          SV            0.08    0.18    0.30    0.44    0.60    0.76
 182          SQ            1.00    3.00    4.00    5.00    6.00    7.00
 183          SE            0.50    1.00    1.50    2.00    2.50    3.00
              *

 184          KK   RO151   ROUTE
 185          RK     590  0.0370   0.013            CIRC   2.000
              *
1                                      HEC-1 INPUT                                 PAGE  6

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

 186          KK   ON151   BASIN
 187          BA   0.007
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```
 189          UC   0.141   0.130
 190          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 191          UA     100
              *

 192          KK   CO151 COMBINE
 193          HC       2
              *

 194          KK   DB151 STORAGE
 195          KO
 196          RS       1    STOR
 197          SV            0.07    0.14    0.22    0.30    0.40    0.51    0.51
 198          SQ            1.00    2.00    2.00    3.00    4.00    5.00   15.00
 199          SE            0.50    1.00    1.50    2.00    2.50    3.00    3.05
              *

 200          KK  OFF105   BASIN
 201          BA   0.084
 202          LG    0.35    0.40    6.00    0.18       0
 203          UC   0.447   0.555
 204          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 205          UA     100
              *

 206          KK  RO215A   ROUTE
 207          RS       1    FLOW
 208          RC   0.050   0.035   0.050     975  0.0360    0.00
 209          RX    0.00    9.00   21.00   25.00   32.00   36.00   70.00   90.00
 210          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
              *

 211          KK  OFF110   BASIN
 212          BA   0.036
 213          LG    0.35    0.40    6.00    0.18       0
 214          UC   0.356   0.492
 215          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 216          UA     100
              *

 217          KK  OFF115   BASIN
 218          BA   0.005
 219          LG    0.35    0.40    6.00    0.18       0
 220          UC   0.191   0.236
 221          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 222          UA     100
              *
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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 223          KK   RO220   ROUTE
 224          RS       1    FLOW
 225          RC   0.050   0.035   0.050     310  0.0420    0.00
 226          RX    0.00    8.00   15.00   21.00   21.10   25.00   30.00   36.00
 227          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
              *

 228          KK   ON220   BASIN
 229          BA   0.003
 230          LG    0.35    0.40    6.00    0.18       0
 231          UC   0.184   0.266
 232          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 233          UA     100
              *

 234          KK   CO220 COMBINE
 235          HC       2
              *

 236          KK  RO215D   ROUTE
 237          RS       1    FLOW
 238          RC   0.050   0.035   0.050     364  0.0300    0.00
 239          RX    0.00    5.00    8.00   11.00   11.10   14.00   17.00   24.00
 240          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *
```

```
242          HC       2
             *

243          KK  RO215B   ROUTE
244          RS       1    FLOW
245          RC   0.050   0.035   0.050     800  0.0340    0.00
246          RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
247          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

248          KK  CO215B COMBINE
249          HC       2
             *

250          KK  RO215C   ROUTE
251          RS       1    FLOW
252          RC   0.050   0.035   0.050     445  0.0340    0.00
253          RX    0.00   12.00   28.00   36.00   48.00   71.00   73.00   76.00
254          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

255          KK   ON215   BASIN
256          BA   0.023
257          LG    0.31    0.29    6.00    0.20      15
258          UC   0.300   0.486
259          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
260          UA     100
             *
1                                        HEC-1 INPUT                                    PAGE  8

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

261          KK   ON216   BASIN
262          BA   0.008
263          LG    0.31    0.27    6.00    0.21      18
264          UC   0.187   0.208
265          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
266          UA     100
             *

267          KK  CO215C COMBINE
268          HC       3
             *

269          KK   ON235   BASIN
270          BA   0.001
271          LG    0.31    0.28    6.00    0.17      14
272          UC   0.038   0.013
273          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
274          UA     100
             *

275          KK  OFF120   BASIN
276          BA   0.094
277          LG    0.35    0.40    6.00    0.18       0
278          UC   0.475   0.682
279          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
280          UA     100
             *

281          KK  RO305A   ROUTE
282          RS       1    FLOW
283          RC   0.050   0.035   0.050     685  0.0480    0.00
284          RX    0.00   10.00   21.00   30.00   43.00   61.00   68.00   75.00
285          RY    3.00    2.00    1.00    0.00    0.00    1.00    0.00    1.00
             *

286          KK  OFF125   BASIN
287          BA   0.108
288          LG    0.35    0.40    6.00    0.18       2
289          UC   0.495   0.725
290          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
291          UA     100
             *

292          KK  RO305B   ROUTE
293          RS       1    FLOW
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```
 295          RX    0.00    6.00    8.00   20.00   32.00   43.00   51.00   66.00
 296          RY    3.00    2.00    1.00    0.00    0.00    1.00    1.50    2.00
              *
1                                      HEC-1 INPUT                                    PAGE  9

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

 297          KK  CO305A COMBINE
 298          HC       2
              *

 299          KK  RO305C   ROUTE
 300          RS       1    FLOW
 301          RC   0.050   0.035   0.050     653  0.0430    0.00
 302          RX    0.00   10.00   15.00   26.00   43.00  155.00  165.00  169.00
 303          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

 304          KK   ON305   BASIN
 305          BA   0.022
 306          LG    0.35    0.40    6.00    0.18       0
 307          UC   0.295   0.347
 308          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 309          UA     100
              *

 310          KK  CO305B COMBINE
 311          HC       2
              *

 312          KK  RO230B   ROUTE
 313          RS       1    FLOW
 314          RC   0.050   0.035   0.050     270  0.0480    0.00
 315          RX    0.00    9.00   42.00   45.00  118.00  122.00  127.00  132.00
 316          RY    3.00    3.00    3.00    0.00    0.00    1.00    2.00    3.00
              *

 317          KK   ON225   BASIN
 318          BA   0.005
 319          LG    0.35    0.40    6.00    0.18       0
 320          UC   0.193   0.224
 321          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 322          UA     100
              *

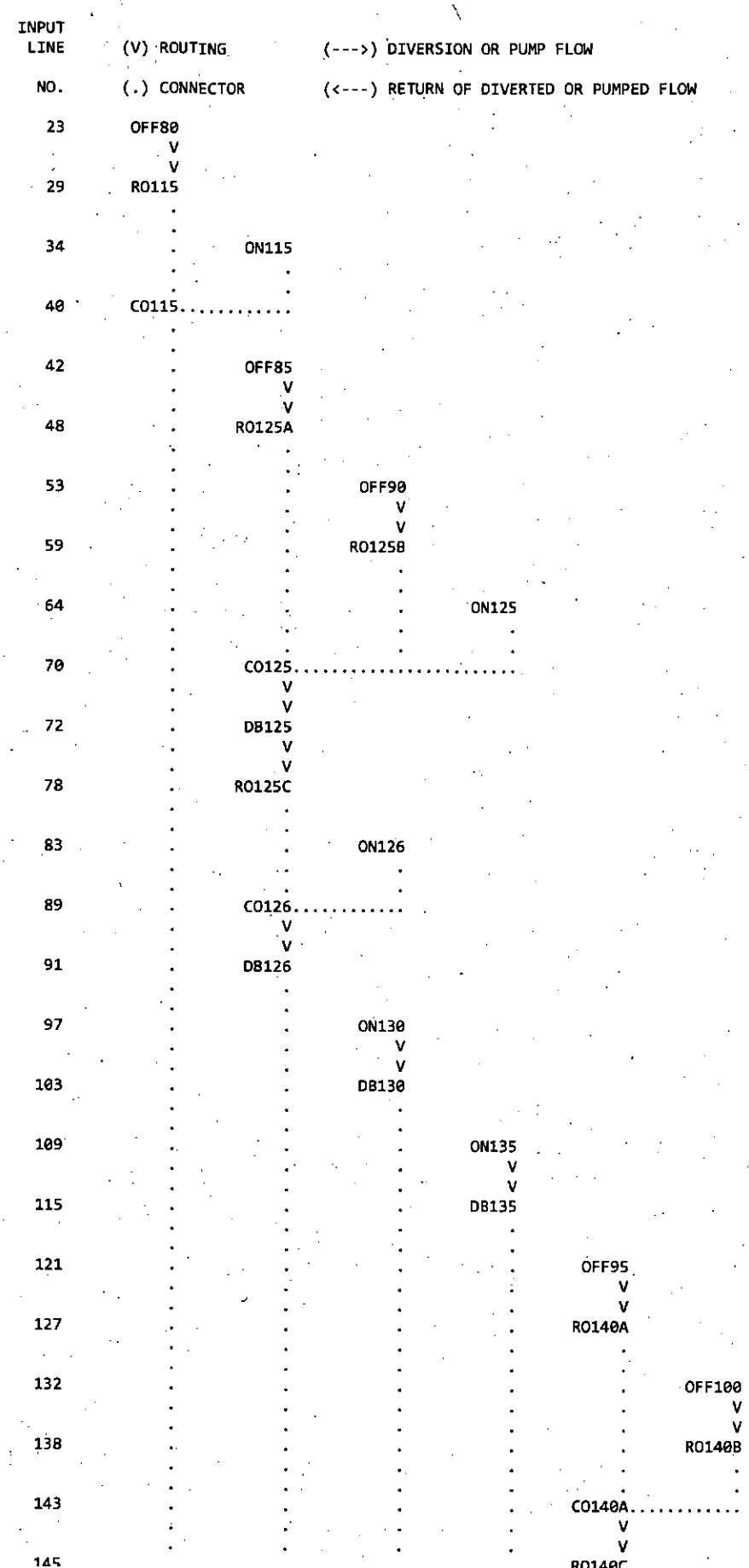
 323          KK   DB225 STORAGE
 324          KO
 325          RS       1    STOR
 326          SV            0.07    0.15    0.21    0.32    0.42    0.53
 327          SQ            1.00    2.00    3.00    4.00    5.00    6.00
 328          SE            0.50    1.00    1.50    2.00    2.50    3.00
              *

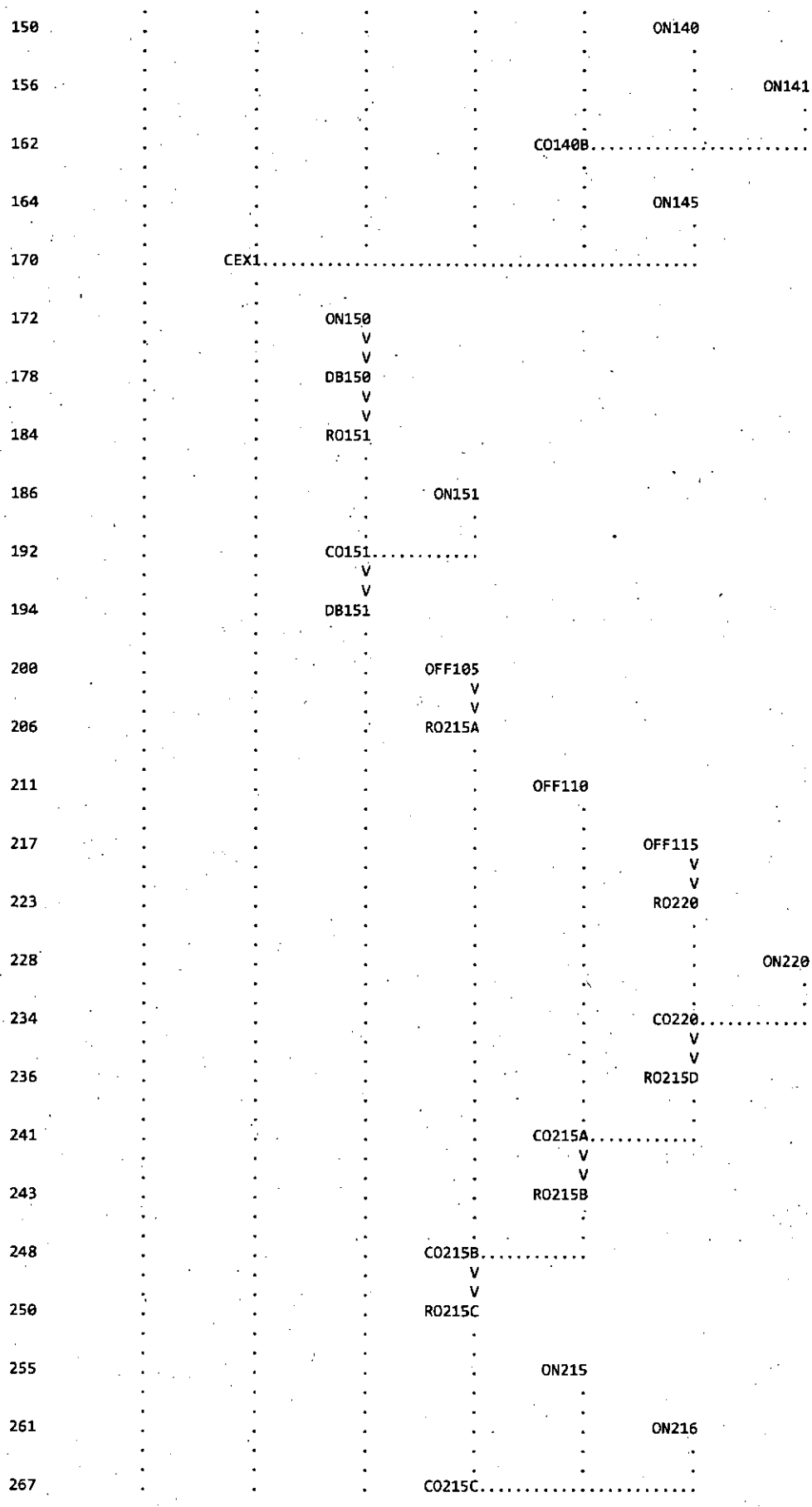
 329          KK  RO230A   ROUTE
 330          RS       1    FLOW
 331          RC   0.013   0.013   0.013     800  0.0325    0.00
 332          RX    0.00    8.00   10.00   20.00   30.00   32.00   40.00   41.00
 333          RY    2.20    2.10    1.80    2.00    1.80    2.10    2.20    2.21
              *
1                                      HEC-1 INPUT                                    PAGE 10

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

 334          KK   ON230   BASIN
 335          BA   0.007
 336          LG    0.31    0.27    6.00    0.17      15
 337          UC   0.156   0.184
 338          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 339          UA     100
              *

 340          KK   CO230 COMBINE
 341          HC       3
              *
 342          ZZ
1
```


INPUT
LINE
(V) ROUTING
(.) CONNECTOR
(---->) DIVERSION OR PUMP FLOW
(<----) RETURN OF DIVERTED OR PUMPED FLOW
23
OFF80
29
RO115
34
ON115
40
CO115
42
OFF85
48
RO125A
53
OFF90
59
RO125B
64
ON125
70
CO125
72
DB125
78
RO125C
83
ON126
89
CO126
91
DB126
97
ON130
103
DB130
109
ON135
115
DB135
121
OFF95
127
RO140A
132
OFF100
138
RO140B
143
CO140A
145
RO140C


150
ON140
156
ON141
162
CO140B
164
ON145
170
CEX1
172
ON150
178
DB150
184
RO151
186
ON151
192
CO151
194
DB151
200
OFF105
206
RO215A
211
OFF110
217
OFF115
223
RO220
228
ON220
234
CO220
236
RO215D
241
CO215A
243
RO215B
248
CO215B
250
RO215C
255
ON215
261
ON216
267
CO215C

```
  269           .           .           .           .       ON235
                .           .           .           .           .
                .           .           .           .           .
  275           .           .           .           .           .      OFF120
                .           .           .           .           .           V
                .           .           .           .           .           V
  281           .           .           .           .           .      RO305A
                .           .           .           .           .           .
                .           .           .           .           .           .
  286           .           .           .           .           .           .      OFF125
                .           .           .           .           .           .           V
                .           .           .           .           .           .           V
  292           .           .           .           .           .           .      RO305B
                .           .           .           .           .           .           .
                .           .           .           .           .           .           .
  297           .           .           .           .           .      CO305A............
                .           .           .           .           .           V
                .           .           .           .           .           V
  299           .           .           .           .           .      RO305C
                .           .           .           .           .           .
                .           .           .           .           .           .
  304           .           .           .           .           .           .       ON305
                .           .           .           .           .           .           .
                .           .           .           .           .           .           .
  310           .           .           .           .           .      CO305B............
                .           .           .           .           .           V
                .           .           .           .           .           V
  312           .           .           .           .           .      RO230B
                .           .           .           .           .           .
                .           .           .           .           .           .
  317           .           .           .           .           .           .       ON225
                .           .           .           .           .           .           V
                .           .           .           .           .           .           V
  323           .           .           .           .           .           .       DB225
                .           .           .           .           .           .           V
                .           .           .           .           .           .           V
  329           .           .           .           .           .           .      RO230A
                .           .           .           .           .           .           .
                .           .           .           .           .           .           .
  334           .           .           .           .           .           .           .       ON230
                .           .           .           .           .           .           .           .
                .           .           .           .           .           .           .           .
  340           .           .           .           .           .       CO230........................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN   1998               *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   12FEB17  TIME  16:37:02   *
 *                                       *
 *****************************************

 *****************************************
 *                                       *
 *   U.S. ARMY CORPS OF ENGINEERS        *
 *   HYDROLOGIC ENGINEERING CENTER       *
 *        609 SECOND STREET              *
 *     DAVIS, CALIFORNIA 95616           *
 *         (916) 756-1104                *
 *                                       *
 *****************************************


                                     Flood Control District of Maricopa County
                                     STORYROCK PH2 PROP - STORYROCK PHASE 2 PROP CONDITION
                                     10 YEAR
                                     6 Hour  Storm
                                     Unit Hydrograph: Clark
                                     Storm: Multiple
                                     02/12/2017

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

      IT           HYDROGRAPH TIME DATA
                          NMIN           5  MINUTES IN COMPUTATION INTERVAL
                         IDATE      1JAN99  STARTING DATE
                         ITIME        0000  STARTING TIME
                            NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                        NDDATE      7JAN99  ENDING DATE
```

```
                ICENT          19  CENTURY MARK

             COMPUTATION INTERVAL     0.08 HOURS
                 TOTAL TIME BASE  166.58 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

 11 JD      INDEX STORM NO. 1
                 STRM        2.11  PRECIPITATION DEPTH
                 TRDA        0.00  TRANSPOSITION DRAINAGE AREA

 12 PI        PRECIPITATION PATTERN
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00    0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.03
              0.03    0.03    0.05    0.05    0.05    0.15    0.15    0.15    0.03    0.03
              0.03    0.01    0.01    0.01    0.01    0.01    0.01    0.00    0.00    0.00
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00

 15 JD      INDEX STORM NO. 2
                 STRM        2.09  PRECIPITATION DEPTH
                 TRDA        0.50  TRANSPOSITION DRAINAGE AREA

 16 PI        PRECIPITATION PATTERN
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00    0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.03
              0.03    0.03    0.05    0.05    0.05    0.15    0.15    0.15    0.03    0.03
              0.03    0.01    0.01    0.01    0.01    0.01    0.01    0.00    0.00    0.00
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00

 19 JD      INDEX STORM NO. 3
                 STRM        2.05  PRECIPITATION DEPTH
                 TRDA        2.80  TRANSPOSITION DRAINAGE AREA

 20 PI        PRECIPITATION PATTERN
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00    0.00    0.01    0.01    0.01    0.01    0.01    0.01    0.03
              0.03    0.03    0.07    0.07    0.07    0.08    0.08    0.08    0.05    0.05
              0.05    0.02    0.02    0.02    0.01    0.01    0.01    0.00    0.00    0.00
              0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
              0.00    0.00

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


          **************
          *            *
 72 KK    *    DB125   *     STORAGE
          *            *
          **************

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


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


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

```
 91 KK       *    DB126  *      STORAGE
             *           *
             *************

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


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

             *************
             *           *
103 KK       *   DB130   *      STORAGE
             *           *
             *************

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


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

             *************
             *           *
115 KK       *   DB135   *      STORAGE
             *           *
             *************

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


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

             *************
             *           *
178 KK       *   DB150   *      STORAGE
             *           *
             *************

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

         *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


         *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


         *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT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*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


*** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION=  1


*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT



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

          **************
          *            *
 194 KK   *   DB151    *      STORAGE
          *            *
          **************

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

*** ***

```
              **************
              *            *
 323 KK       *   DB225    *     STORAGE
              *            *
              **************

 324 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 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	OFF80	24.	4.33	3.	1.	0.	0.04		
+	ROUTED TO	RO115	24.	4.33	3.	1.	0.	0.04		
+	HYDROGRAPH AT	ON115	5.	4.17	1.	0.	0.	0.01		
+	2 COMBINED AT	CO115	29.	4.33	4.	1.	0.	0.05		
+	HYDROGRAPH AT	OFF85	1.	4.08	0.	0.	0.	0.00		
+	ROUTED TO	RO125A	1.	4.17	0.	0.	0.	0.00		
+	HYDROGRAPH AT	OFF90	3.	4.00	0.	0.	0.	0.00		
+	ROUTED TO	RO125B	3.	4.08	0.	0.	0.	0.00		
+	HYDROGRAPH AT	ON125	16.	4.08	1.	0.	0.	0.01		
+	3 COMBINED AT	CO125	19.	4.08	1.	0.	0.	0.01		
+	ROUTED TO	DB125	16.	4.17	1.	0.	0.	0.01		
+	ROUTED TO	RO125C	16.	4.25	1.	0.	0.	0.01		
+	HYDROGRAPH AT	ON126	9.	4.08	1.	0.	0.	0.01		
+	2 COMBINED AT	CO126	24.	4.17	2.	1.	0.	0.02		
+	ROUTED TO	DB126	14.	4.33	2.	1.	0.	0.02		
+	HYDROGRAPH AT	ON130	11.	4.17	1.	0.	0.	0.01		
+	ROUTED TO	DB130	9.	4.33	1.	0.	0.	0.01		
+	HYDROGRAPH AT	ON135	11.	4.17	1.	0.	0.	0.01		

+	DB135	3.	4.58	1.	0.	0.	0.01
HYDROGRAPH AT							
+	OFF95	35.	4.33	5.	1.	0.	0.06
ROUTED TO							
+	RO140A	35.	4.33	5.	1.	0.	0.06
HYDROGRAPH AT							
+	OFF100	7.	4.17	1.	0.	0.	0.01
ROUTED TO							
+	RO140B	7.	4.25	1.	0.	0.	0.01
2 COMBINED AT							
+	CO140A	41.	4.33	6.	1.	0.	0.07
ROUTED TO							
+	RO140C	39.	4.33	6.	1.	0.	0.07
HYDROGRAPH AT							
+	ON140	10.	4.25	2.	0.	0.	0.02
HYDROGRAPH AT							
+	ON141	8.	4.08	1.	0.	0.	0.00
3 COMBINED AT							
+	CO140B	50.	4.33	8.	2.	1.	0.09
HYDROGRAPH AT							
+	ON145	5.	4.08	1.	0.	0.	0.00
5 COMBINED AT							
+	CEX1	79.	4.33	13.	3.	1.	0.14
HYDROGRAPH AT							
+	ON150	14.	4.08	1.	0.	0.	0.01
ROUTED TO							
+	DB150	4.	4.33	1.	0.	0.	0.01
ROUTED TO							
+	RO151	4.	4.33	1.	0.	0.	0.01
HYDROGRAPH AT							
+	ON151	11.	4.08	1.	0.	0.	0.01
2 COMBINED AT							
+	CO151	14.	4.08	2.	0.	0.	0.02
ROUTED TO							
+	DB151	4.	4.67	2.	0.	0.	0.02
HYDROGRAPH AT							
+	OFF105	48.	4.33	6.	2.	1.	0.08
ROUTED TO							
+	RO215A	46.	4.42	6.	2.	1.	0.08
HYDROGRAPH AT							
+	OFF110	23.	4.25	3.	1.	0.	0.04
HYDROGRAPH AT							
+	OFF115	5.	4.08	0.	0.	0.	0.00
ROUTED TO							
+	RO220	5.	4.17	0.	0.	0.	0.00
HYDROGRAPH AT							
+	ON220	3.	4.08	0.	0.	0.	0.00
2 COMBINED AT							
+	CO220	8.	4.17	1.	0.	0.	0.01
ROUTED TO							
+	RO215D	8.	4.17	1.	0.	0.	0.01
2 COMBINED AT							

	ROUTED TO							
+		RO215B	29.	4.25	3.	1.	0.	0.04
	2 COMBINED AT							
+		CO215B	72.	4.33	10.	2.	1.	0.13
	ROUTED TO							
+		RO215C	71.	4.42	10.	2.	1.	0.13
	HYDROGRAPH AT							
+		ON215	18.	4.25	2.	1.	0.	0.02
	HYDROGRAPH AT							
+		ON216	11.	4.08	1.	0.	0.	0.01
	3 COMBINED AT							
+		CO215C	90.	4.33	13.	3.	1.	0.16
	HYDROGRAPH AT							
+		ON235	2.	4.00	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		OFF120	46.	4.33	7.	2.	1.	0.09
	ROUTED TO							
+		RO305A	45.	4.42	7.	2.	1.	0.09
	HYDROGRAPH AT							
+		OFF125	51.	4.33	9.	2.	1.	0.11
	ROUTED TO							
+		RO305B	51.	4.42	9.	2.	1.	0.11
	2 COMBINED AT							
+		CO305A	96.	4.42	16.	4.	1.	0.20
	ROUTED TO							
+		RO305C	95.	4.42	16.	4.	1.	0.20
	HYDROGRAPH AT							
+		ON305	18.	4.17	2.	0.	0.	0.02
	2 COMBINED AT							
+		CO305B	106.	4.42	18.	4.	1.	0.22
	ROUTED TO							
+		RO230B	106.	4.42	18.	4.	1.	0.22
	HYDROGRAPH AT							
+		ON225	5.	4.08	0.	0.	0.	0.00
	ROUTED TO							
+		DB225	2.	4.42	0.	0.	0.	0.00
	ROUTED TO							
+		RO230A	2.	4.50	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON230	10.	4.08	1.	0.	0.	0.01
	3 COMBINED AT							
+		CO230	111.	4.42	19.	5.	2.	0.24

1

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) = 0.00									
RO151	MANE	0.37	3.92	260.62	1.00	5.00	3.91	260.00	1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4814E+00 EXCESS=0.0000E+00 OUTFLOW=0.4814E+00 BASIN STORAGE=0.6341E-17 PERCENT ERROR= 0.0

```
          FOR STORM = 2  STORM AREA (SQ MI) =       0.50
            RO151  MANE          0.37      3.89    260.78      0.99      5.00      3.88    260.00        0.99

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4765E+00 EXCESS=0.0000E+00 OUTFLOW=0.4765E+00 BASIN STORAGE=0.6341E-17 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =       2.80
            RO151  MANE          0.26      3.13    265.57      0.80      5.00      3.13    265.00        0.80

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3835E+00 EXCESS=0.0000E+00 OUTFLOW=0.3835E+00 BASIN STORAGE=0.6320E-17 PERCENT ERROR=   0.0



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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            JUN   1998                 *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   12FEB17  TIME  16:37:07   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*            (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       STORYROCK PH2 PROP - STORYROCK PHASE 2 PROP CONDITION
  3           ID        100 YEAR
  4           ID        6 Hour Storm
  5           ID        Unit Hydrograph: Clark
  6           ID        Storm: Multiple
  7           ID        02/12/2017
              *DIAGRAM
  8           IT      5  1JAN99      0    2000
  9           IO      5
 10           IN     15
              *
 11           JD  3.174  0.0001
 12           PC  0.000  0.008  0.016  0.025  0.033  0.041  0.050  0.058  0.066  0.074
 13           PC  0.087  0.099  0.118  0.138  0.216  0.377  0.834  0.911  0.931  0.950
 14           PC  0.962  0.972  0.983  0.991  1.000
 15           JD  3.155  0.5000
 16           PC  0.000  0.008  0.016  0.025  0.033  0.041  0.050  0.058  0.066  0.074
 17           PC  0.087  0.099  0.118  0.138  0.216  0.377  0.834  0.911  0.931  0.950
 18           PC  0.962  0.972  0.983  0.991  1.000
 19           JD  3.095  12.8
 20           PC  0.000  0.009  0.016  0.025  0.034  0.042  0.051  0.059  0.067  0.076
 21           PC  0.087  0.100  0.120  0.163  0.252  0.451  0.694  0.837  0.900  0.938
 22           PC  0.950  0.963  0.975  0.988  1.000
              *
 23           KK  OFF80  BASIN
 24           BA  0.042
 25           LG  0.35   0.40   6.00   0.18      0
 26           UC  0.314  0.409
 27           UA     0   3.0    5.0    8.0   12.0   20.0   43.0   75.0   90.0   96.0
 28           UA   100
              *

 29           KK  RO115  ROUTE
 30           RS     1   FLOW
 31           RC  0.050  0.035  0.050   540  0.0260   0.00
 32           RX  0.00   12.00  18.00  18.50  19.00  27.00  29.00  34.00
 33           RY  3.00   2.00   1.00   0.00   0.00   1.00   2.00   3.00
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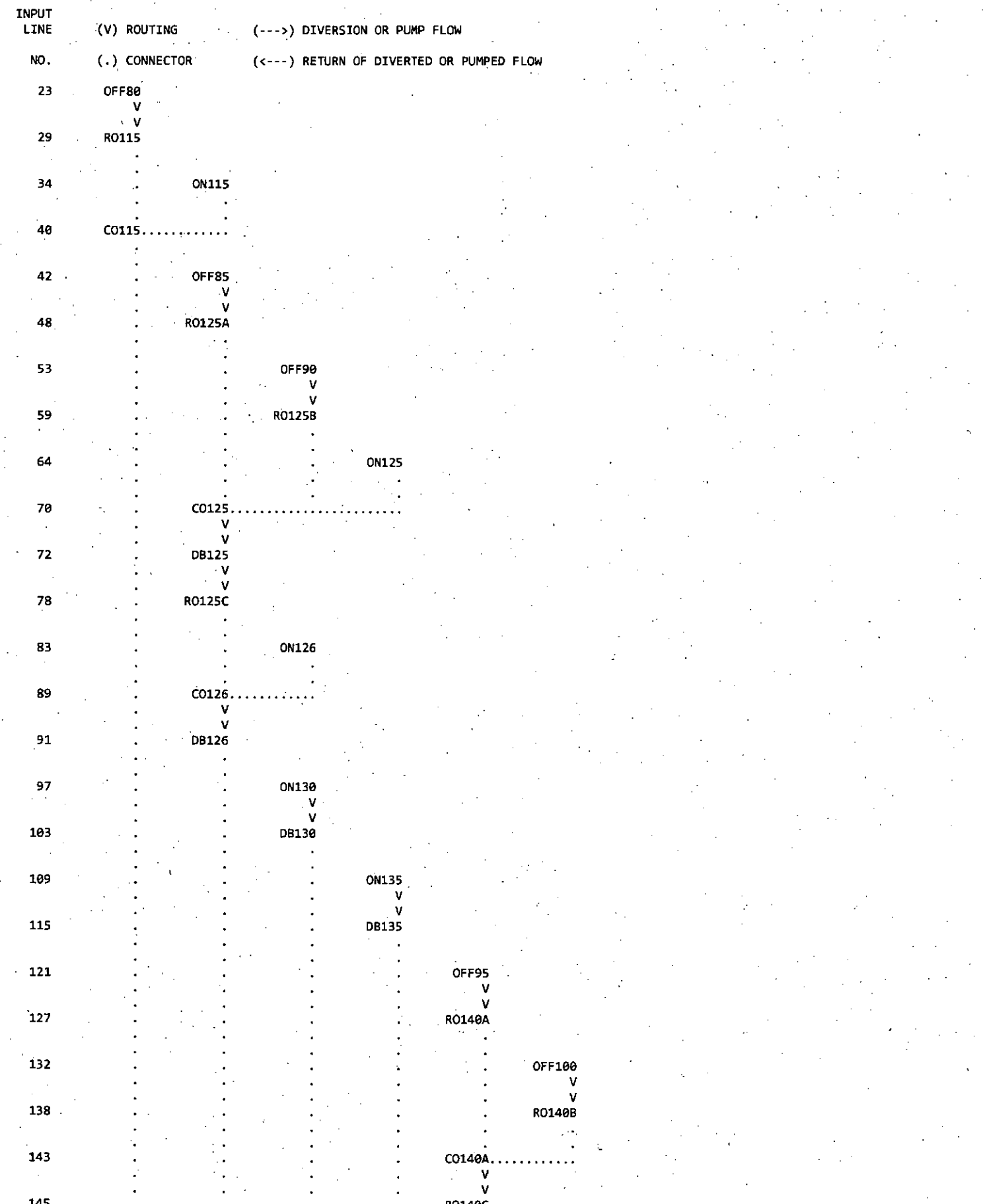
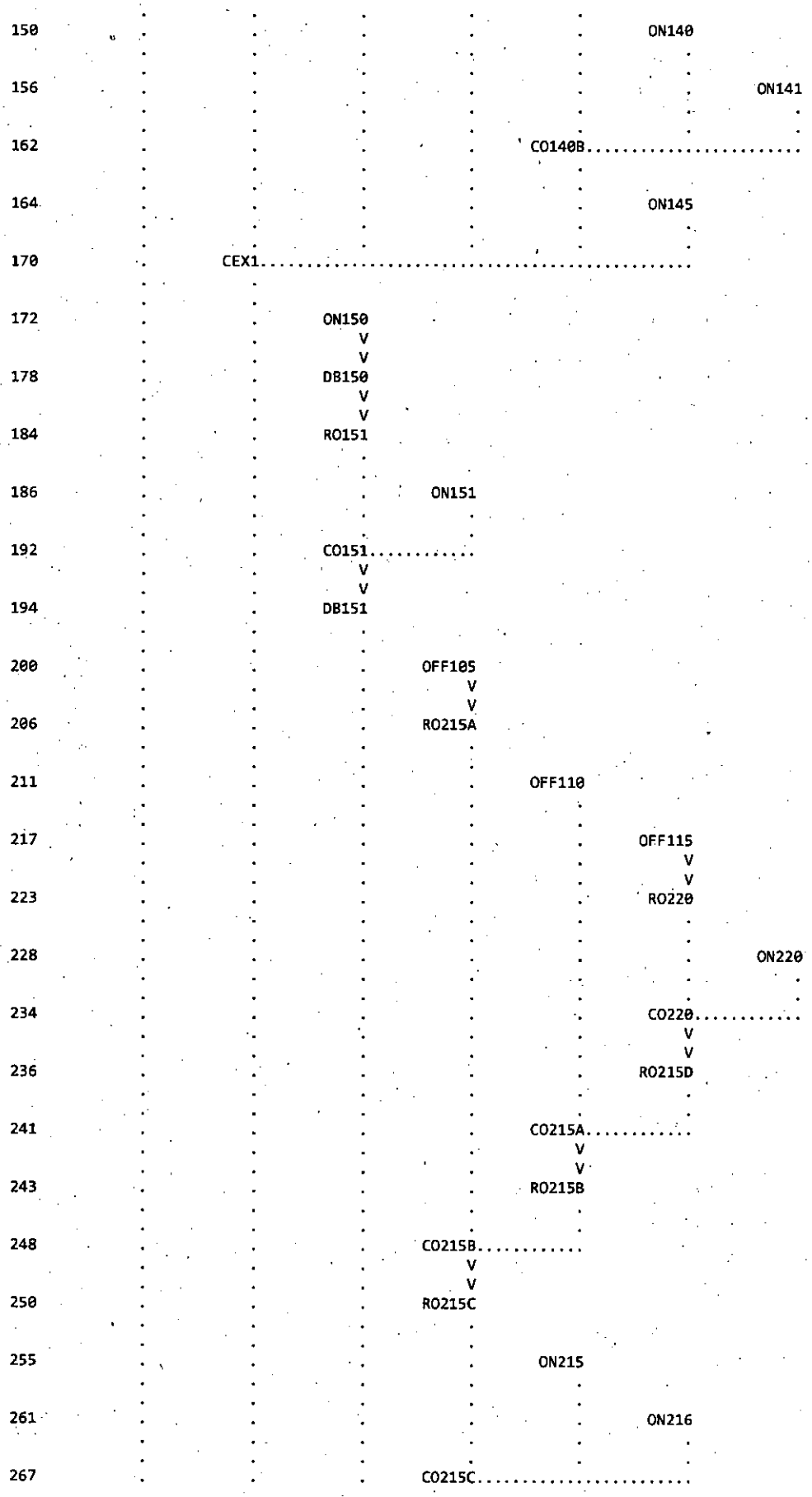

INPUT
LINE
(V) ROUTING
(.) CONNECTOR
(---->) DIVERSION OR PUMP FLOW
(<---) RETURN OF DIVERTED OR PUMPED FLOW
NO.
23
OFF80
V
V
29
RO115
34
ON115
40
CO115
42
OFF85
V
V
48
RO125A
53
OFF90
V
V
59
RO125B
64
ON125
70
CO125
V
V
72
DB125
V
V
78
RO125C
83
ON126
89
CO126
V
V
91
DB126
97
ON130
V
V
103
DB130
109
ON135
V
V
115
DB135
121
OFF95
V
V
127
RO140A
132
OFF100
V
V
138
RO140B
143
CO140A
V
V
145
RO140C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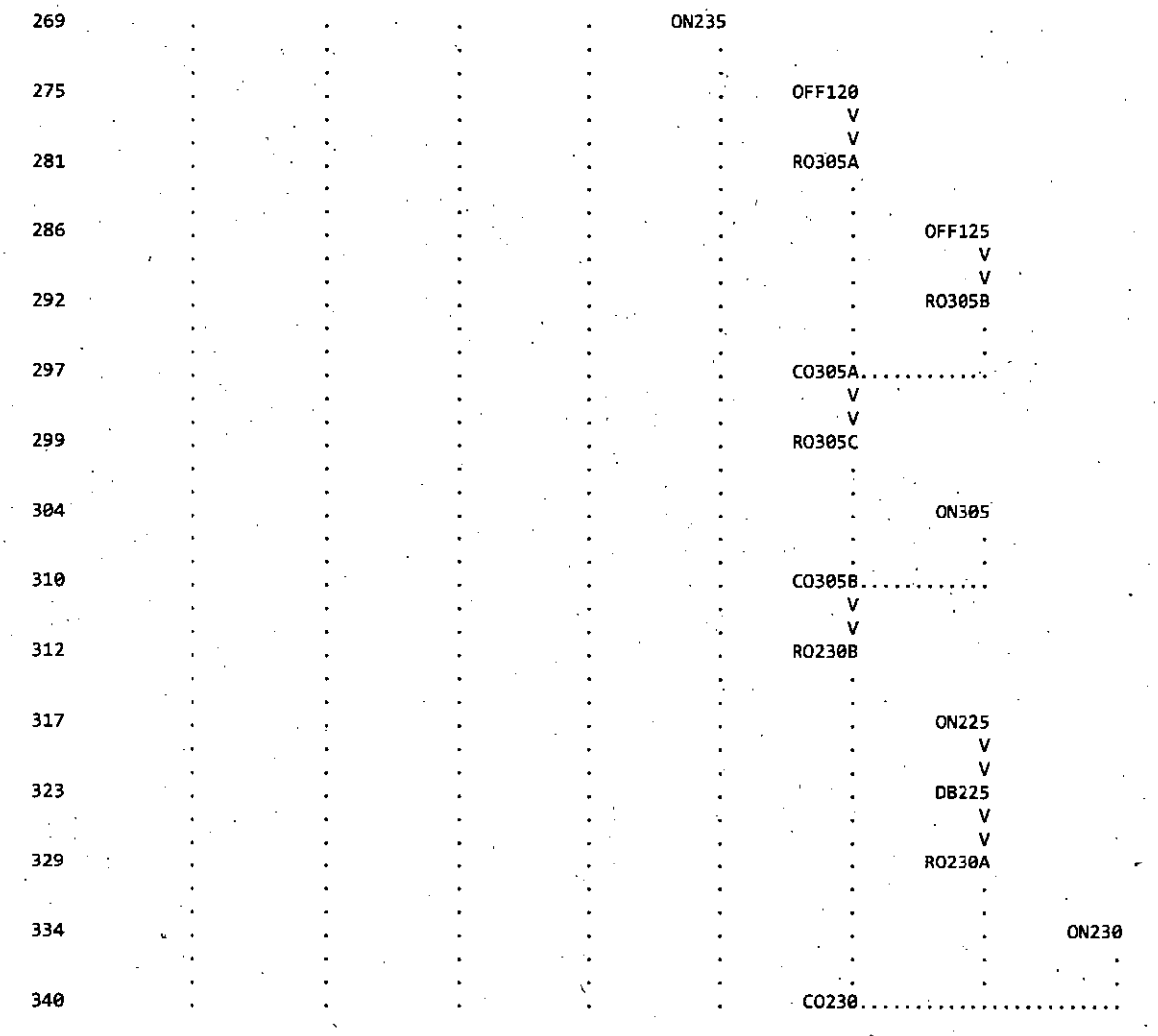
ON140
156
ON141
162
CO140B
164
ON145
170
CEX1
172
ON150
178
DB150
184
RO151
186
ON151
192
CO151
194
DB151
200
OFF105
206
RO215A
211
OFF110
217
OFF115
223
RO220
228
ON220
234
CO220
236
RO215D
241
CO215A
243
RO215B
248
CO215B
250
RO215C
255
ON215
261
ON216
267
CO215C



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   12FEB17  TIME  16:37:07   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

Flood Control District of Maricopa County
STORYROCK PH2 PROP - STORYROCK PHASE 2 PROP CONDITION
100 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
02/12/2017

9 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	5	MINUTES IN COMPUTATION INTERVAL
IDATE	1JAN99	STARTING DATE
ITIME	0000	STARTING TIME
NQ	2000	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	7JAN99	ENDING DATE

```
                ICENT          19  CENTURY MARK

              COMPUTATION INTERVAL     0.08 HOURS
                  TOTAL TIME BASE   166.58 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

11 JD          INDEX STORM NO. 1
                     STRM        3.17  PRECIPITATION DEPTH
                     TRDA        0.00  TRANSPOSITION DRAINAGE AREA

12 PI           PRECIPITATION PATTERN
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.03
                  0.03      0.03      0.05      0.05      0.05      0.15      0.15      0.15      0.03      0.03
                  0.03      0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00

15 JD          INDEX STORM NO. 2
                     STRM        3.15  PRECIPITATION DEPTH
                     TRDA        0.50  TRANSPOSITION DRAINAGE AREA

16 PI           PRECIPITATION PATTERN
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.03
                  0.03      0.03      0.05      0.05      0.05      0.15      0.15      0.15      0.03      0.03
                  0.03      0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00

19 JD          INDEX STORM NO. 3
                     STRM        3.10  PRECIPITATION DEPTH
                     TRDA        2.80  TRANSPOSITION DRAINAGE AREA

20 PI           PRECIPITATION PATTERN
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.03
                  0.03      0.03      0.07      0.07      0.07      0.08      0.08      0.08      0.05      0.05
                  0.05      0.02      0.02      0.02      0.01      0.01      0.01      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00

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

           **************
           *            *
72 KK      *    DB125   *      STORAGE
           *            *
           **************

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

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

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

```
 91 KK      *     DB126  *      STORAGE
            *            *
            **************

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


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


            **************
            *            *
103 KK      *     DB130  *      STORAGE
            *            *
            **************

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

WARNING --- ROUTED OUTFLOW (     20.) IS GREATER THAN MAXIMUM OUTFLOW (     20.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     20.) IS GREATER THAN MAXIMUM OUTFLOW (     20.) IN STORAGE-OUTFLOW TABLE


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


            **************
            *            *
115 KK      *     DB135  *      STORAGE
            *            *
            **************

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


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


            **************
            *            *
178 KK      *     DB150  *      STORAGE
            *            *
            **************

179 KO           OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
         *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


         *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


         *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT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         *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT
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         *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


         *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


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

          **************
          *            *
  194 KK  *    DB151   *     STORAGE
          *            *
          **************

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


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

          **************
          *            *
  323 KK  *    DB225   *     STORAGE
          *            *
          **************

  324 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 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT									
+		OFF80	59.	4.25	7.	2.	1.	0.04		
	ROUTED TO									
+		RO115	60.	4.25	7.	2.	1.	0.04		
	HYDROGRAPH AT									
+		ON115	11.	4.17	2.	0.	0.	0.01		
	2 COMBINED AT									
+		CO115	70.	4.25	9.	2.	1.	0.05		
	HYDROGRAPH AT									
+		OFF85	2.	4.00	0.	0.	0.	0.00		
	ROUTED TO									
+		RO125A	2.	4.08	0.	0.	0.	0.00		
	HYDROGRAPH AT									
+		OFF90	6.	4.00	0.	0.	0.	0.00		
	ROUTED TO									
+		RO125B	6.	4.00	0.	0.	0.	0.00		

+		ON125	29.	4.08	2.	1.	0.	0.01
	3 COMBINED AT							
+		CO125	36.	4.08	3.	1.	0.	0.01
	ROUTED TO							
+		DB125	36.	4.08	3.	1.	0.	0.01
	ROUTED TO							
+		RO125C	31.	4.17	3.	1.	0.	0.01
	HYDROGRAPH AT							
+		ON126	17.	4.08	1.	0.	0.	0.01
	2 COMBINED AT							
+		CO126	46.	4.08	4.	1.	0.	0.02
	ROUTED TO							
+		DB126	29.	4.25	4.	1.	0.	0.02
	HYDROGRAPH AT							
+		ON130	24.	4.08	2.	1.	0.	0.01
	ROUTED TO							
+		DB130	20.	4.25	2.	1.	0.	0.01
	HYDROGRAPH AT							
+		ON135	21.	4.08	2.	1.	0.	0.01
	ROUTED TO							
+		DB135	11.	4.33	2.	1.	0.	0.01
	HYDROGRAPH AT							
+		OFF95	88.	4.25	10.	3.	1.	0.06
	ROUTED TO							
+		RO140A	88.	4.25	10.	3.	1.	0.06
	HYDROGRAPH AT							
+		OFF100	17.	4.08	2.	0.	0.	0.01
	ROUTED TO							
+		RO140B	16.	4.17	2.	0.	0.	0.01
	2 COMBINED AT							
+		CO140A	102.	4.25	12.	3.	1.	0.07
	ROUTED TO							
+		RO140C	101.	4.25	12.	3.	1.	0.07
	HYDROGRAPH AT							
+		ON140	21.	4.17	3.	1.	0.	0.02
	HYDROGRAPH AT							
+		ON141	14.	4.00	1.	0.	0.	0.00
	3 COMBINED AT							
+		CO140B	126.	4.25	16.	4.	1.	0.09
	HYDROGRAPH AT							
+		ON145	11.	4.08	1.	0.	0.	0.00
	5 COMBINED AT							
+		CEX1	186.	4.25	26.	6.	2.	0.14
	HYDROGRAPH AT							
+		ON150	24.	4.00	2.	0.	0.	0.01
	ROUTED TO							
+		DB150	6.	4.33	2.	0.	0.	0.01
	ROUTED TO							
+		RO151	6.	4.33	2.	0.	0.	0.01
	HYDROGRAPH AT							
+		ON151	21.	4.00	1.	0.	0.	0.01
	2 COMBINED AT							

	ROUTED TO						
+		DB151	15.	4.17	2.	1.	0.	0.02
	HYDROGRAPH AT						
+		OFF105	120.	4.25	14.	3.	1.	0.08
	ROUTED TO						
+		RO215A	114.	4.25	14.	3.	1.	0.08
	HYDROGRAPH AT						
+		OFF110	56.	4.17	6.	1.	0.	0.04
	HYDROGRAPH AT						
+		OFF115	12.	4.08	1.	0.	0.	0.00
	ROUTED TO						
+		RO220	11.	4.08	1.	0.	0.	0.00
	HYDROGRAPH AT						
+		ON220	7.	4.08	1.	0.	0.	0.00
	2 COMBINED AT						
+		CO220	18.	4.08	1.	0.	0.	0.01
	ROUTED TO						
+		RO215D	18.	4.08	1.	0.	0.	0.01
	2 COMBINED AT						
+		CO215A	72.	4.17	7.	2.	1.	0.04
	ROUTED TO						
+		RO215B	69.	4.17	7.	2.	1.	0.04
	2 COMBINED AT						
+		CO215B	182.	4.25	21.	5.	2.	0.13
	ROUTED TO						
+		RO215C	181.	4.25	21.	5.	2.	0.13
	HYDROGRAPH AT						
+		ON215	39.	4.17	5.	1.	0.	0.02
	HYDROGRAPH AT						
+		ON216	20.	4.08	2.	0.	0.	0.01
	3 COMBINED AT						
+		CO215C	225.	4.25	28.	7.	2.	0.16
	HYDROGRAPH AT						
+		ON235	3.	4.00	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		OFF120	118.	4.25	16.	4.	1.	0.09
	ROUTED TO						
+		RO305A	117.	4.25	16.	4.	1.	0.09
	HYDROGRAPH AT						
+		OFF125	130.	4.25	18.	5.	2.	0.11
	ROUTED TO						
+		RO305B	127.	4.33	18.	5.	2.	0.11
	2 COMBINED AT						
+		CO305A	242.	4.25	34.	8.	3.	0.20
	ROUTED TO						
+		RO305C	243.	4.33	34.	8.	3.	0.20
	HYDROGRAPH AT						
+		ON305	41.	4.08	4.	1.	0.	0.02
	2 COMBINED AT						
+		CO305B	267.	4.33	38.	9.	3.	0.22
	ROUTED TO						
+		RO230B	268.	4.33	38.	9.	3.	0.22

	HYDROGRAPH AT							
+		ON225	12.	4.08	1.	0.	0.	0.00
	ROUTED TO							
+		DB225	4.	4.33	1.	0.	0.	0.00
	ROUTED TO							
+		RO230A	4.	4.42	1.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON230	18.	4.00	1.	0.	0.	0.01
	3 COMBINED AT							
+		CO230	277.	4.33	40.	10.	3.	0.24

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	PEAK (INTERPOLATED TO COMPUTATION INTERVAL)	TIME TO PEAK (INTERPOLATED TO COMPUTATION INTERVAL)	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR STORM = 1 STORM AREA (SQ MI) = 0.00									
RO151	MANE	0.25	6.02	260.57	1.90	5.00	6.01	260.00	1.90

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9113E+00 EXCESS=0.0000E+00 OUTFLOW=0.9113E+00 BASIN STORAGE=0.6474E-17 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50									
RO151	MANE	0.25	5.99	260.51	1.88	5.00	5.98	260.00	1.88

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9038E+00 EXCESS=0.0000E+00 OUTFLOW=0.9038E+00 BASIN STORAGE=0.6466E-17 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80									
RO151	MANE	0.25	5.03	265.48	1.65	5.00	5.03	265.00	1.65

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7928E+00 EXCESS=0.0000E+00 OUTFLOW=0.7928E+00 BASIN STORAGE=0.6447E-17 PERCENT ERROR= 0.0

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

Appendix C – Hydraulics

HEC-RAS Output (Existing and Proposed Conditions)

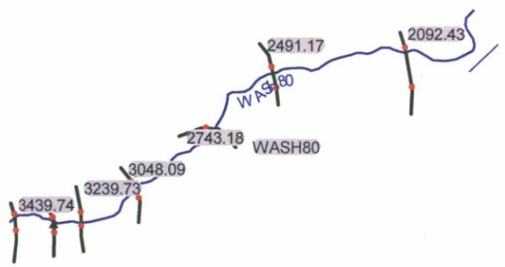
- Schematic Geometry
- Cross Sections
- Profiles
- Summary Table

HY-8 Output:

- Preliminary Culvert Calculations

First Flush Spillway/Dissipation Basin Design:

HEC-RAS Existing Condition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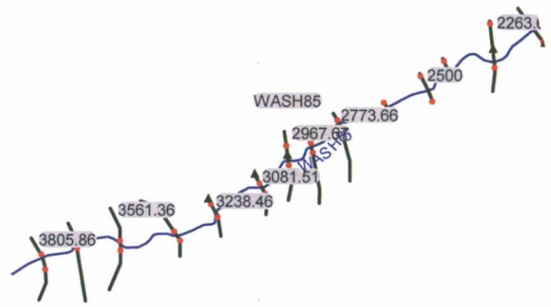
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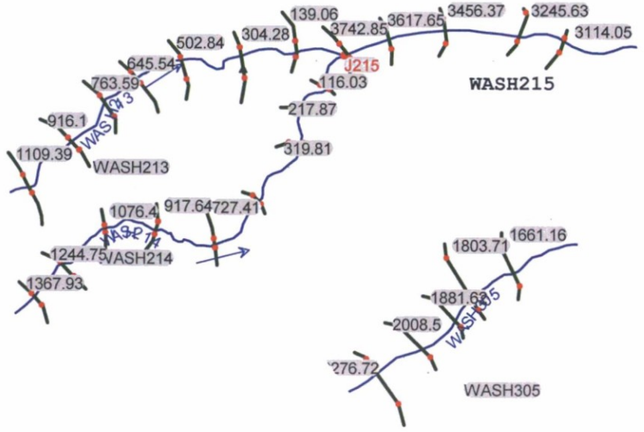
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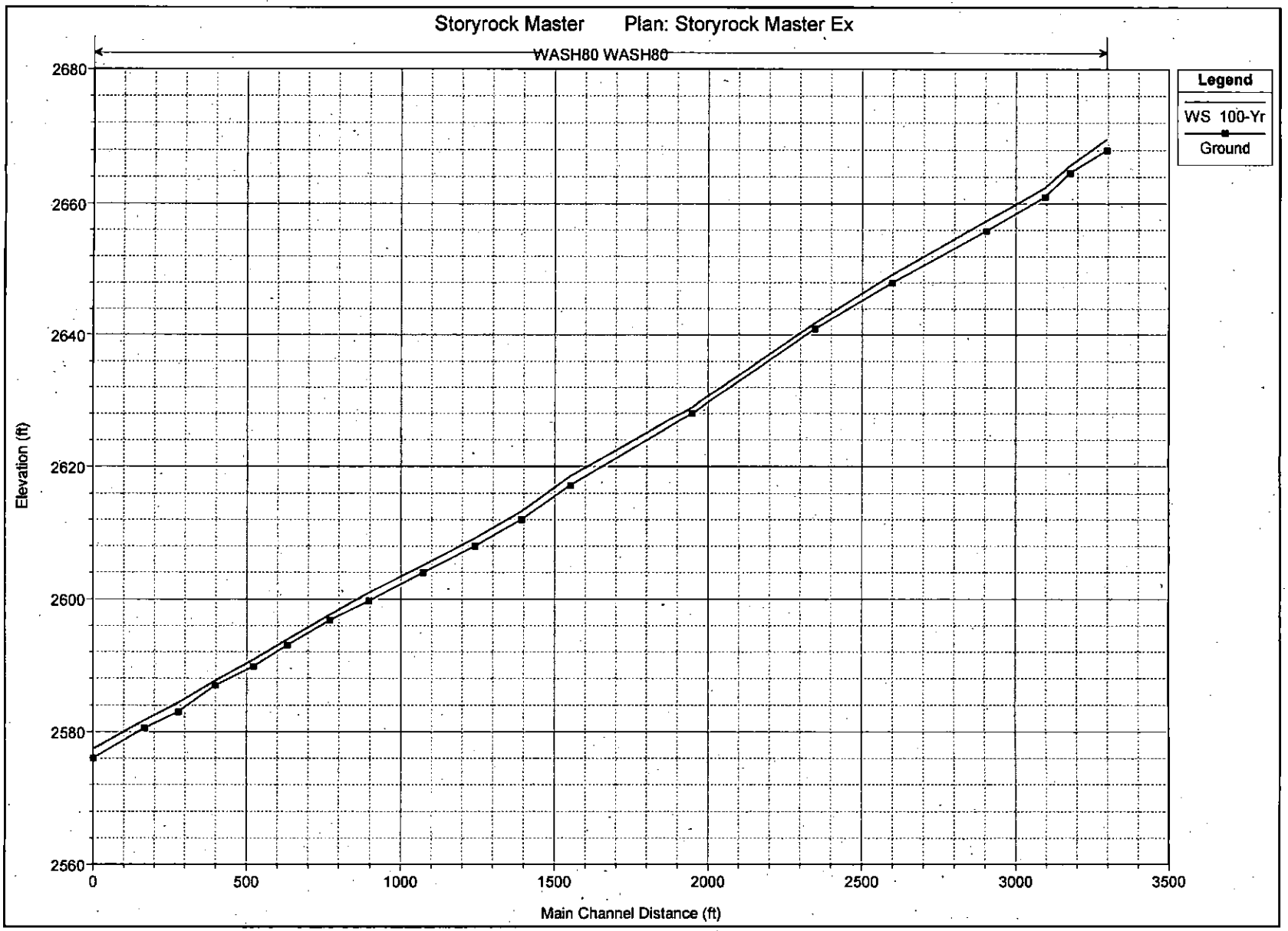
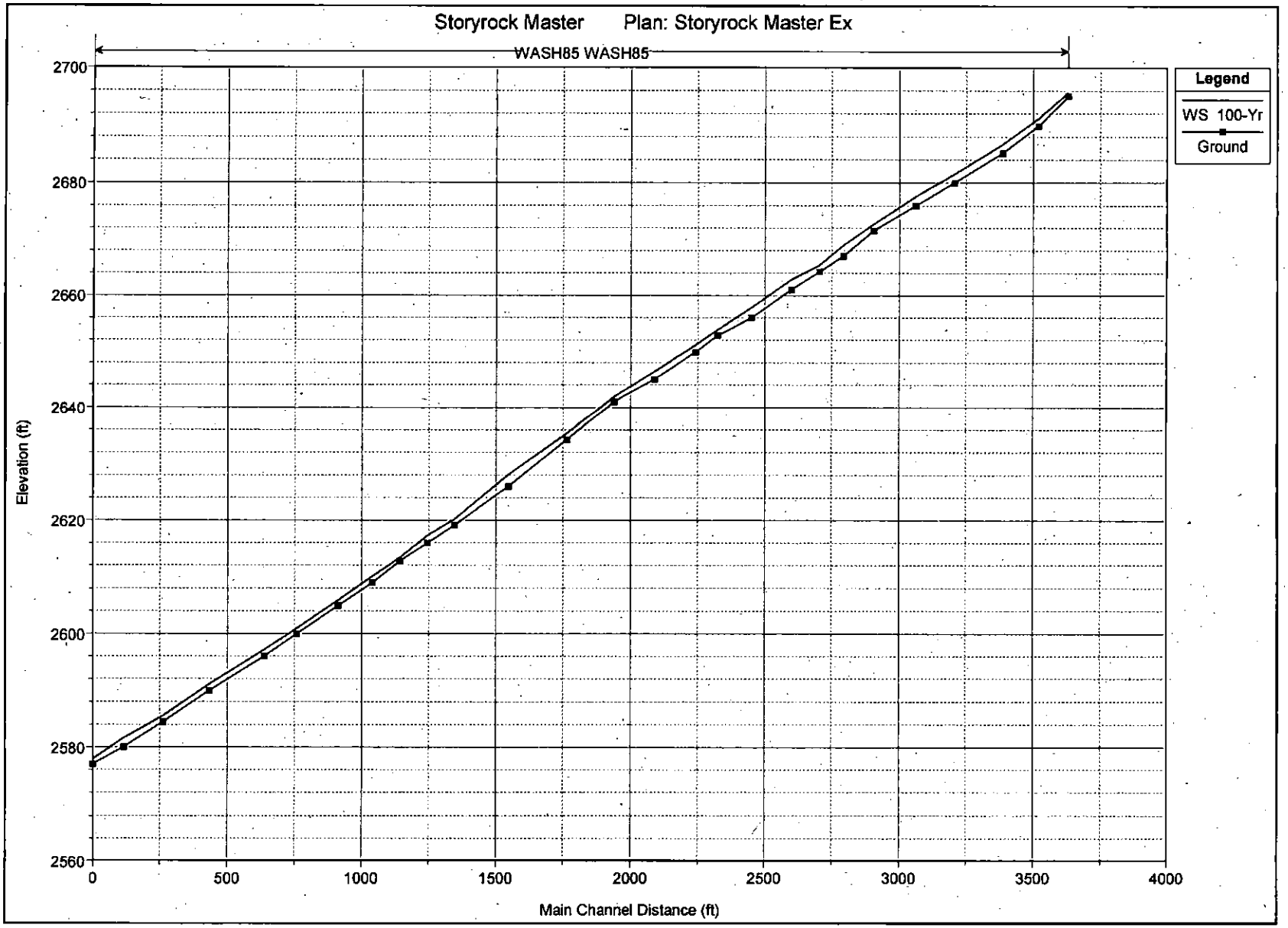
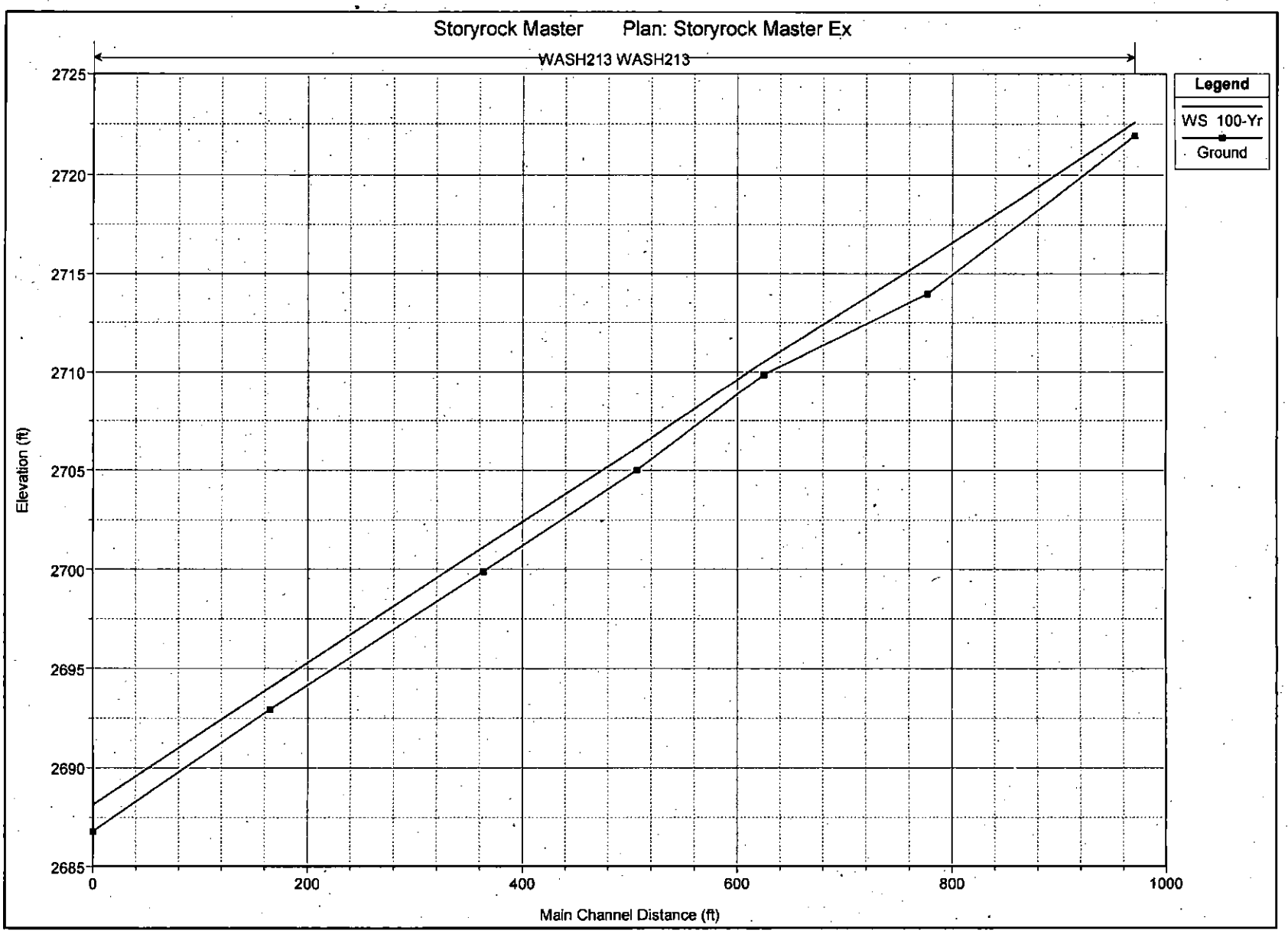
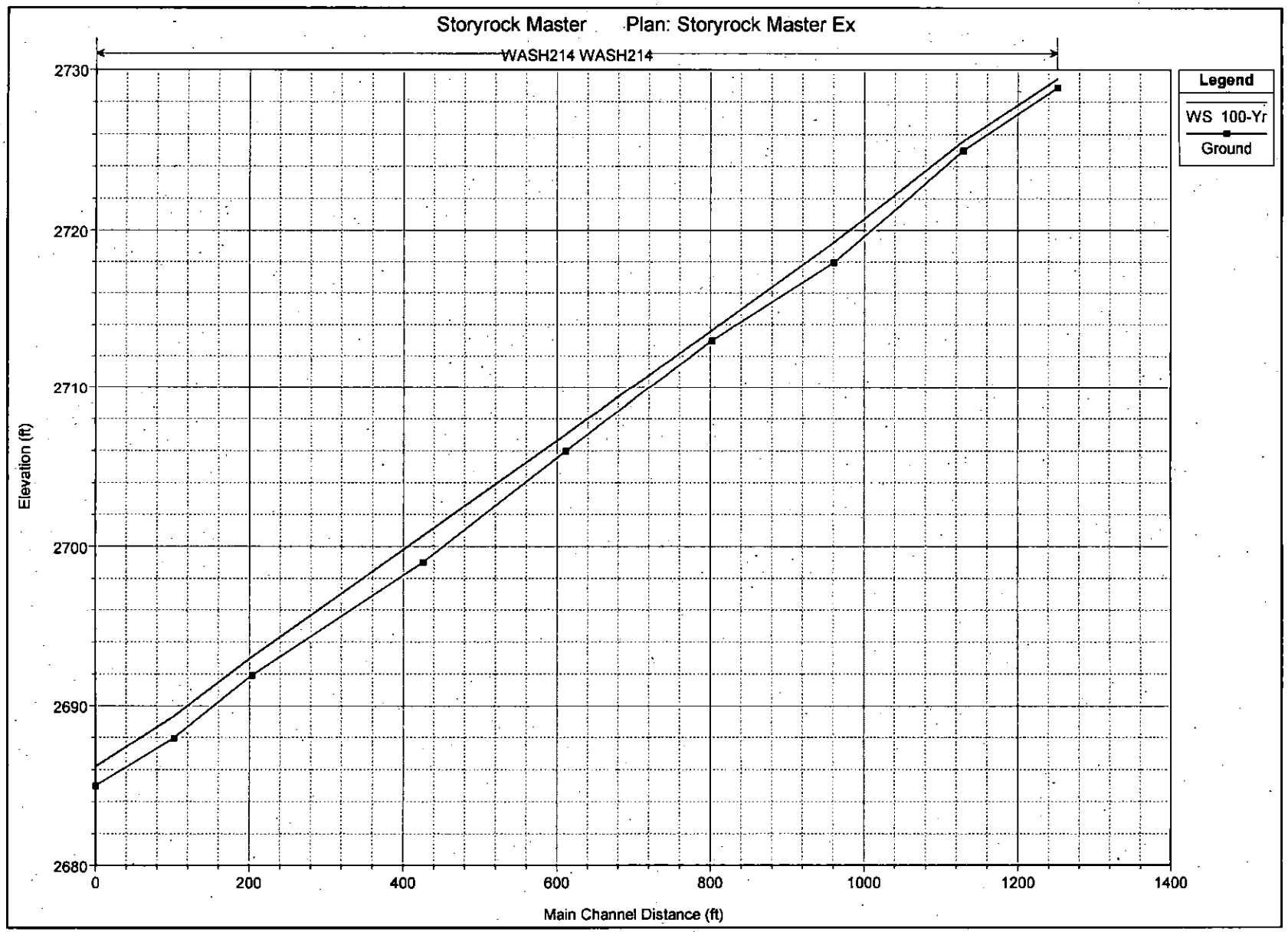
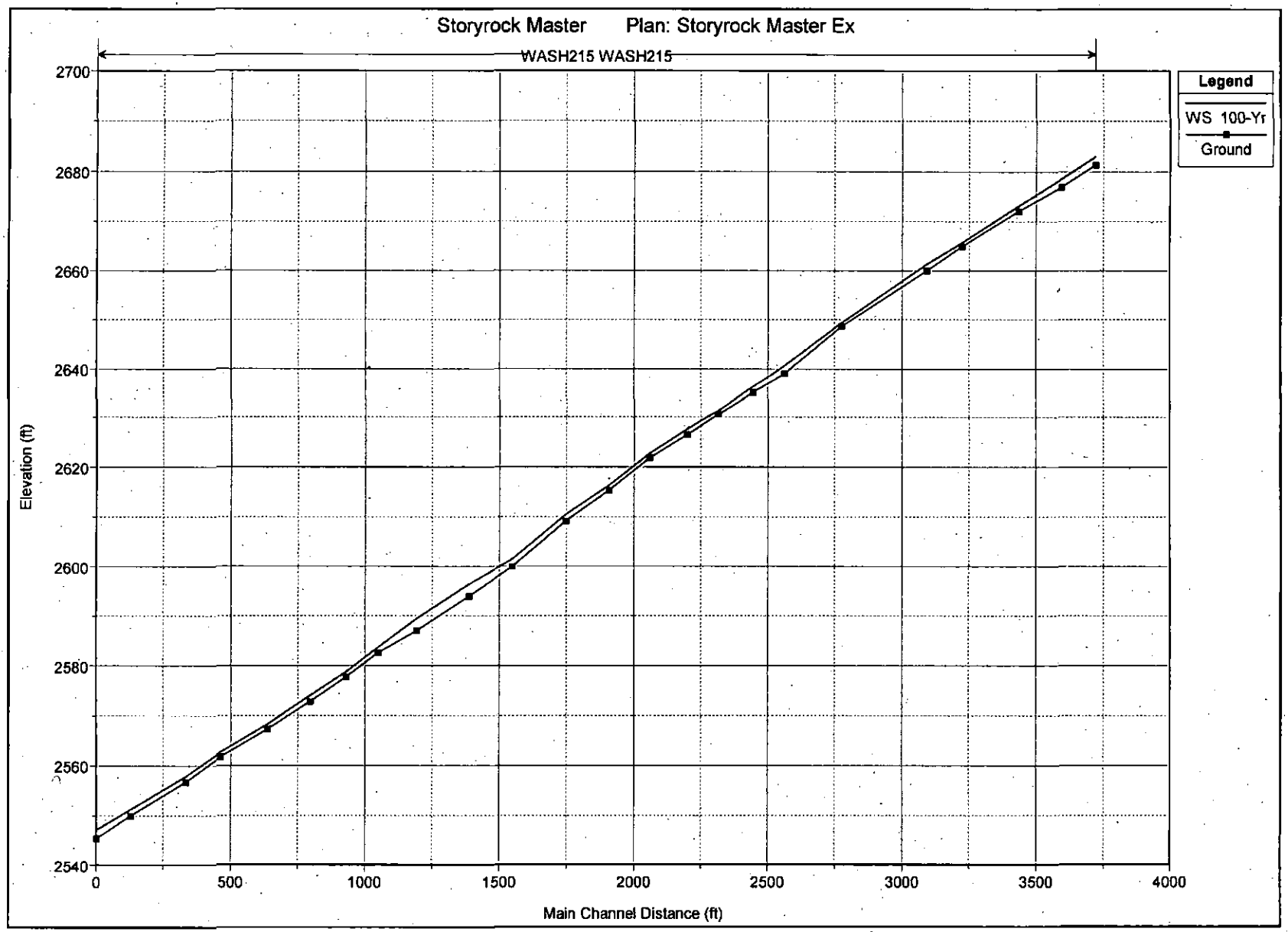
3742.85
3617.65
3456.37
3245.63
3114.05
304.28
502.84
645.54
763.59
916.1
1109.39
WASH213
J215
116.03
WASH215
217.87
319.81
727.41
917.64
1076.4
1244.75
WASH214
1367.93
1803.71
1661.16
1881.63
2008.5
276.72
WASH305

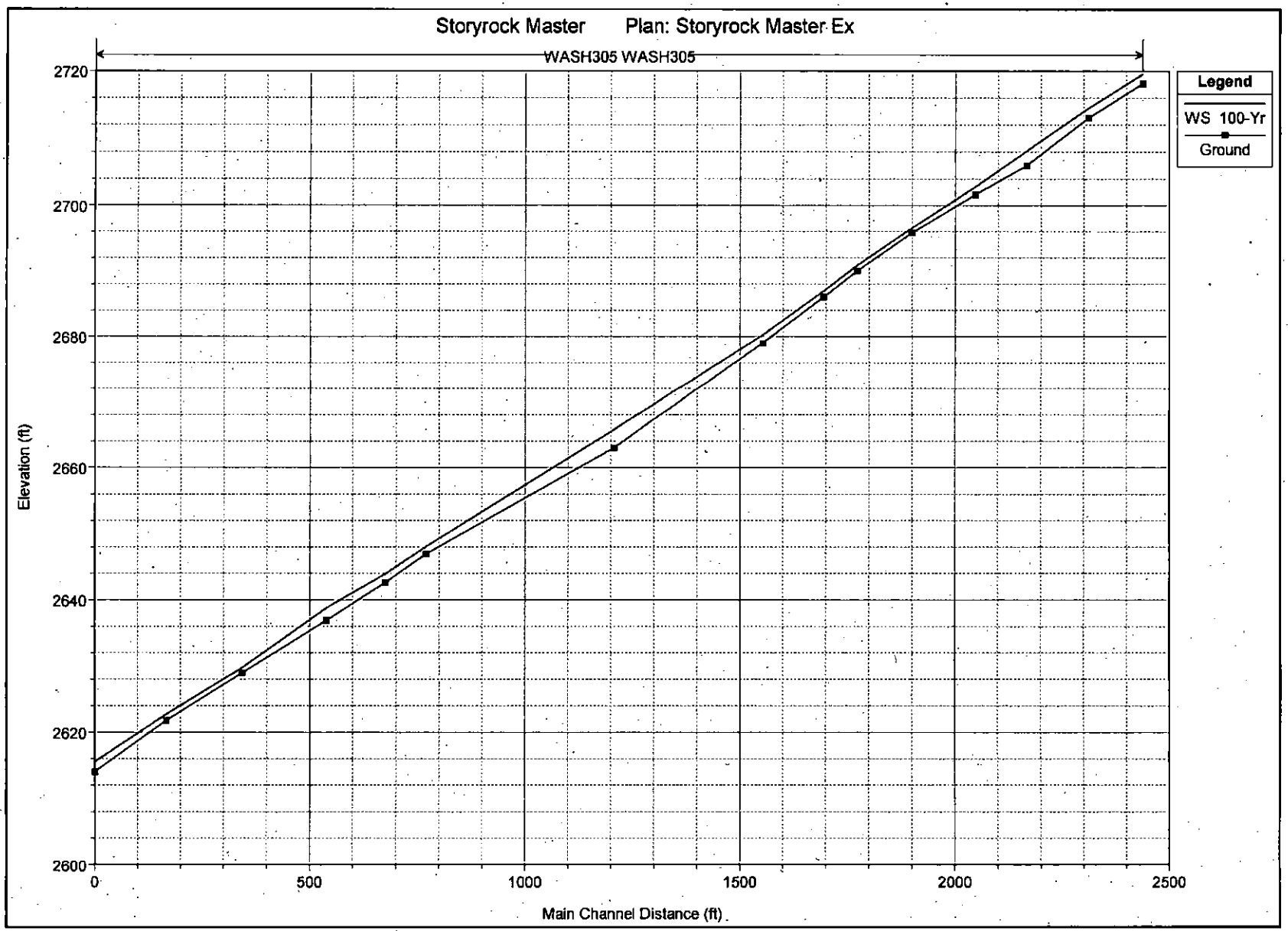

Storyrock Master Plan: Storyrock Master Ex
WASH80 WASH80
Legend
WS 100-Yr
Ground
Elevation (ft)
2680
2660
2640
2620
2600
2580
2560
0
500
1000
1500
2000
2500
3000
3500
Main Channel Distance (ft)

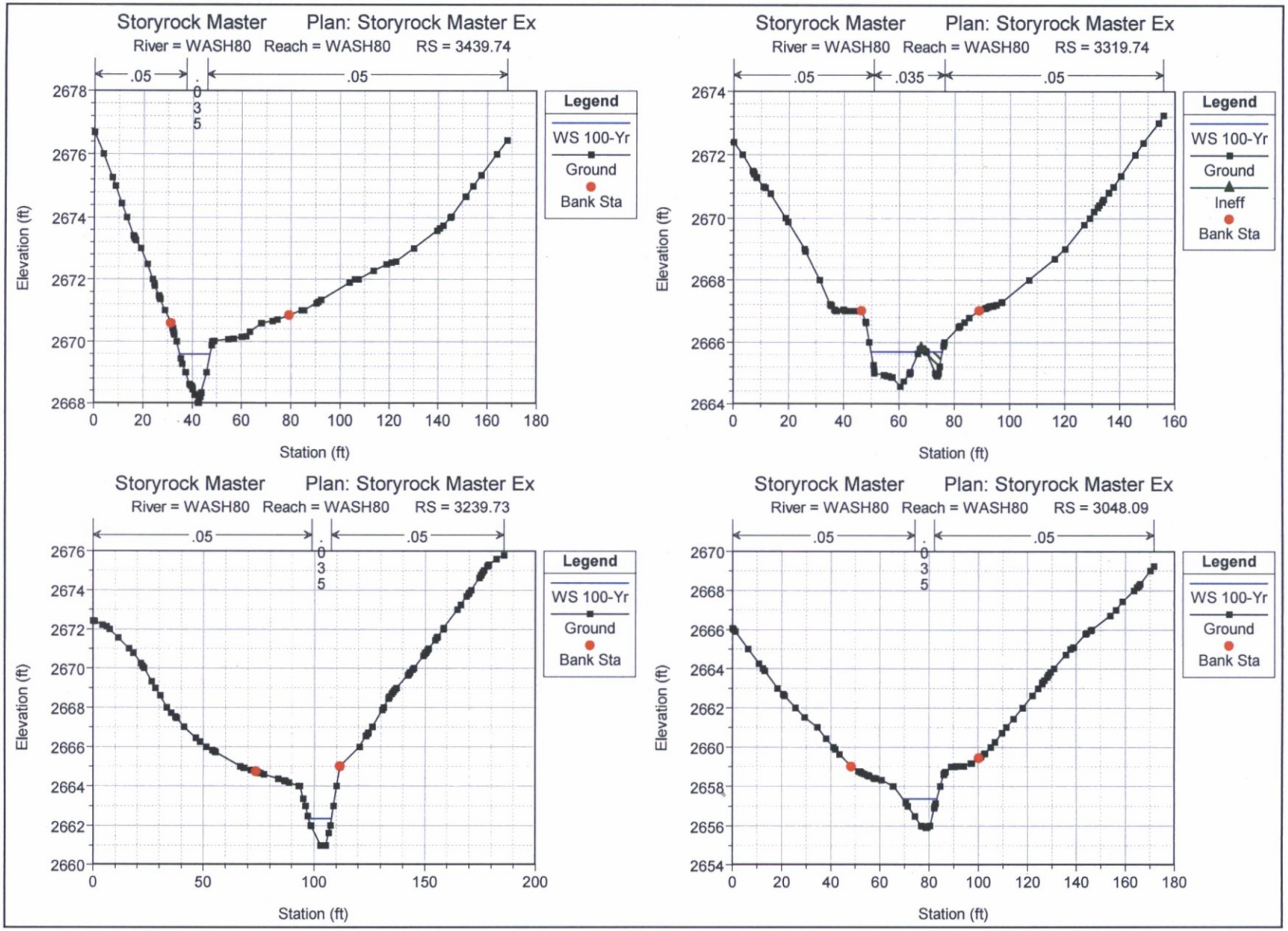

Storyrock Master Plan: Storyrock Master Ex
WASH85 WASH85
Legend
WS 100-Yr
Ground
Elevation (ft)
2700
2680
2660
2640
2620
2600
2580
2560
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)

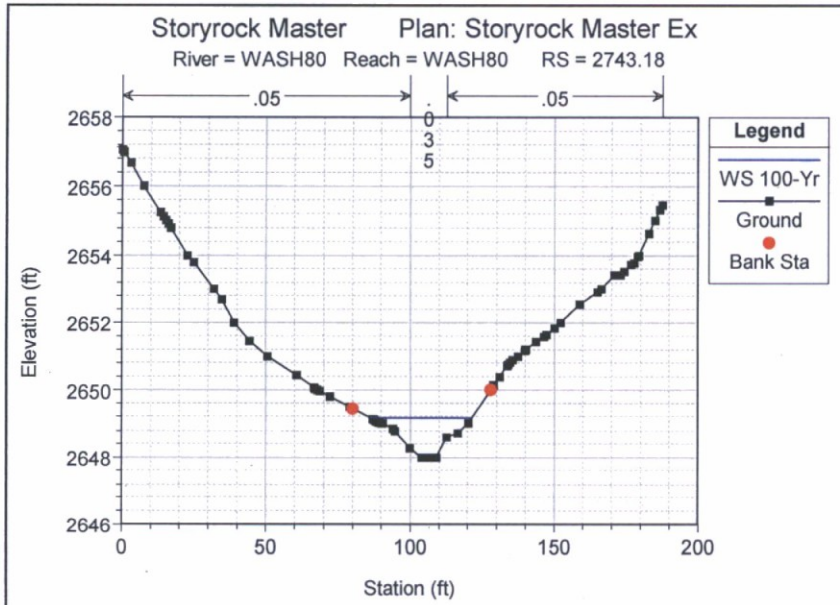

Storyrock Master Plan: Storyrock Master Ex
WASH213 WASH213
Legend
WS 100-Yr
Ground
Elevation (ft)
2725
2720
2715
2710
2705
2700
2695
2690
2685
0
200
400
600
800
1000
Main Channel Distance (ft)

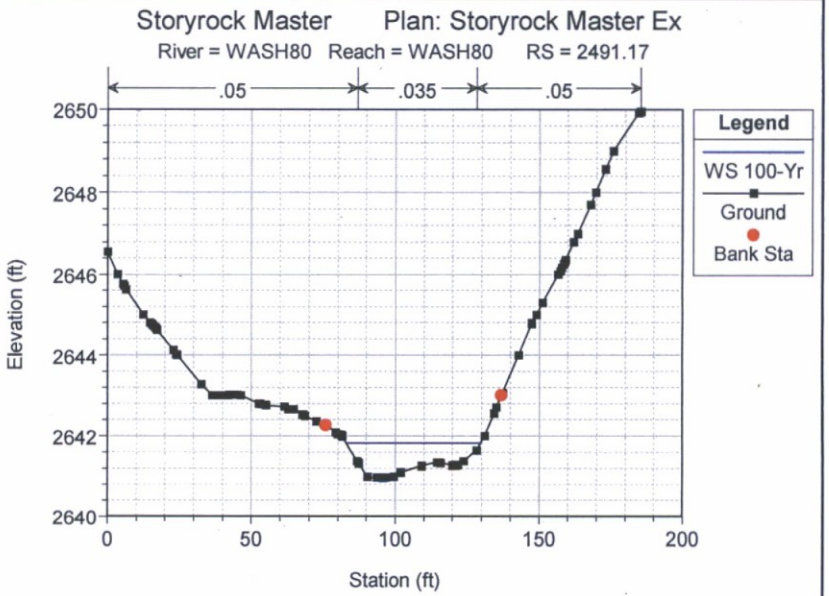

Storyrock Master Plan: Storyrock Master Ex
WASH214 WASH214
Legend
WS 100-Yr
Ground
Elevation (ft)
2730
2720
2710
2700
2690
2680
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)

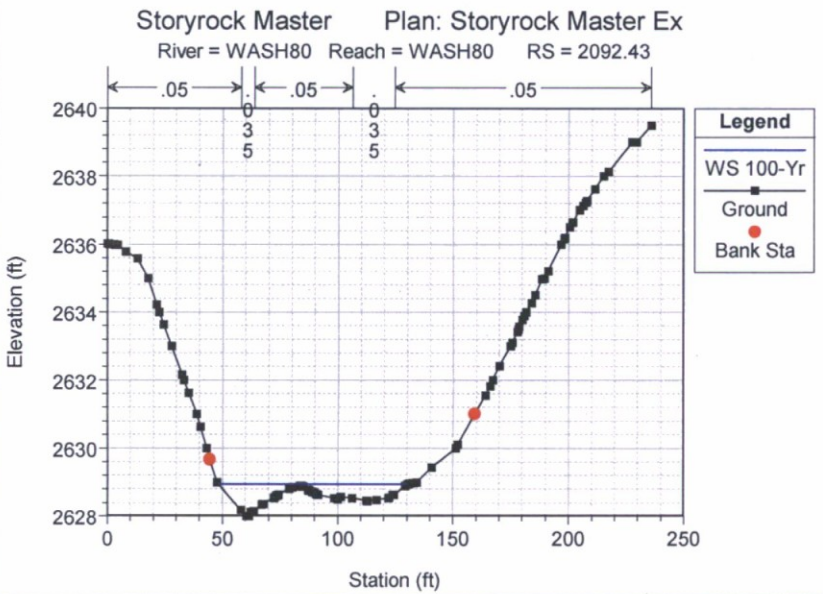

Storyrock Master Plan: Storyrock Master Ex
WASH215 WASH215
Legend
WS 100-Yr
Ground
Elevation (ft)
2700
2680
2660
2640
2620
2600
2580
2560
2540
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)

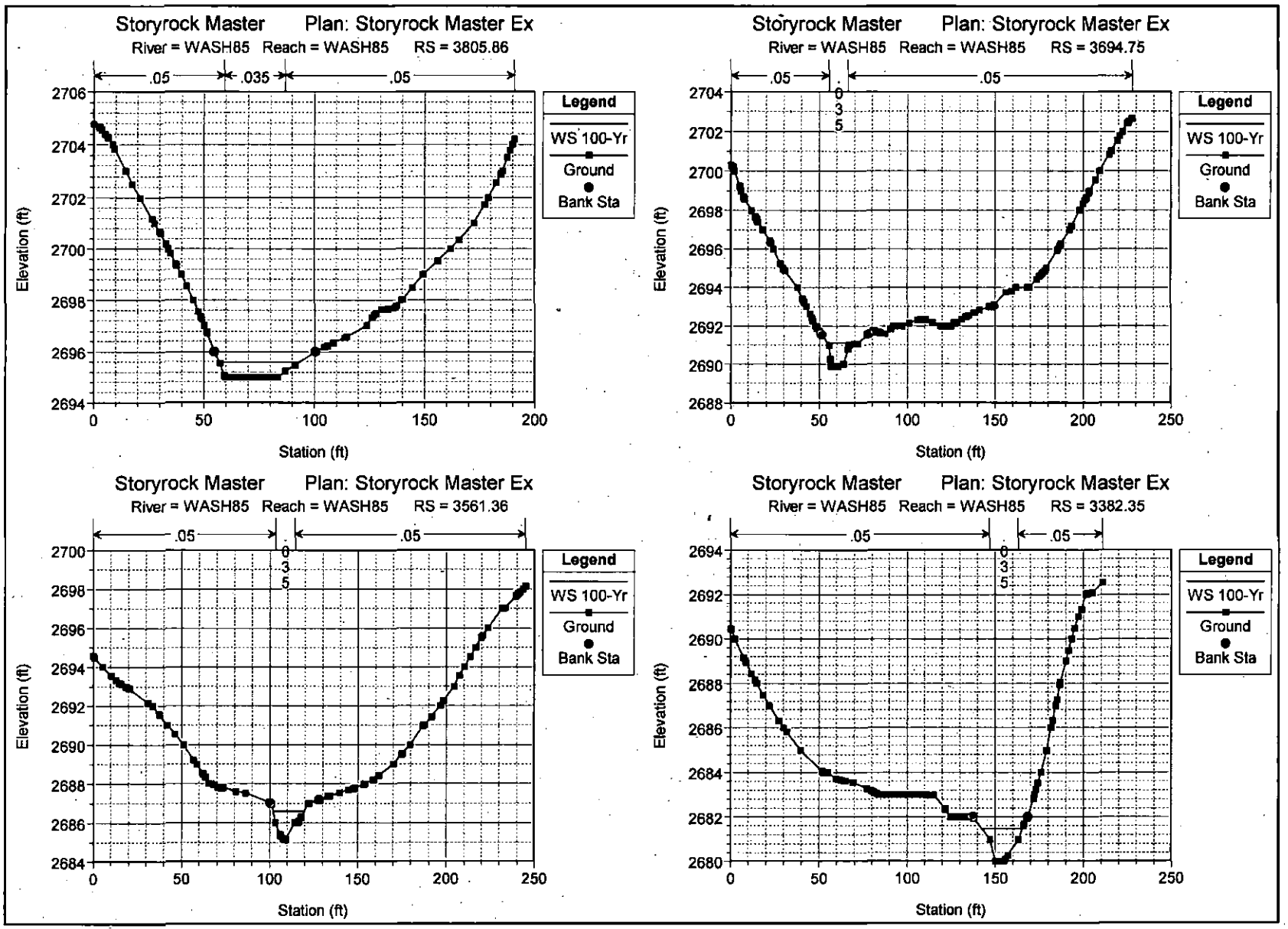

Storyrock Master Plan: Storyrock Master Ex
WASH305 WASH305
Legend
WS 100-Yr
Ground
Elevation (ft)
2720
2700
2680
2660
2640
2620
2600
0
500
1000
1500
2000
2500
Main Channel Distance (ft)

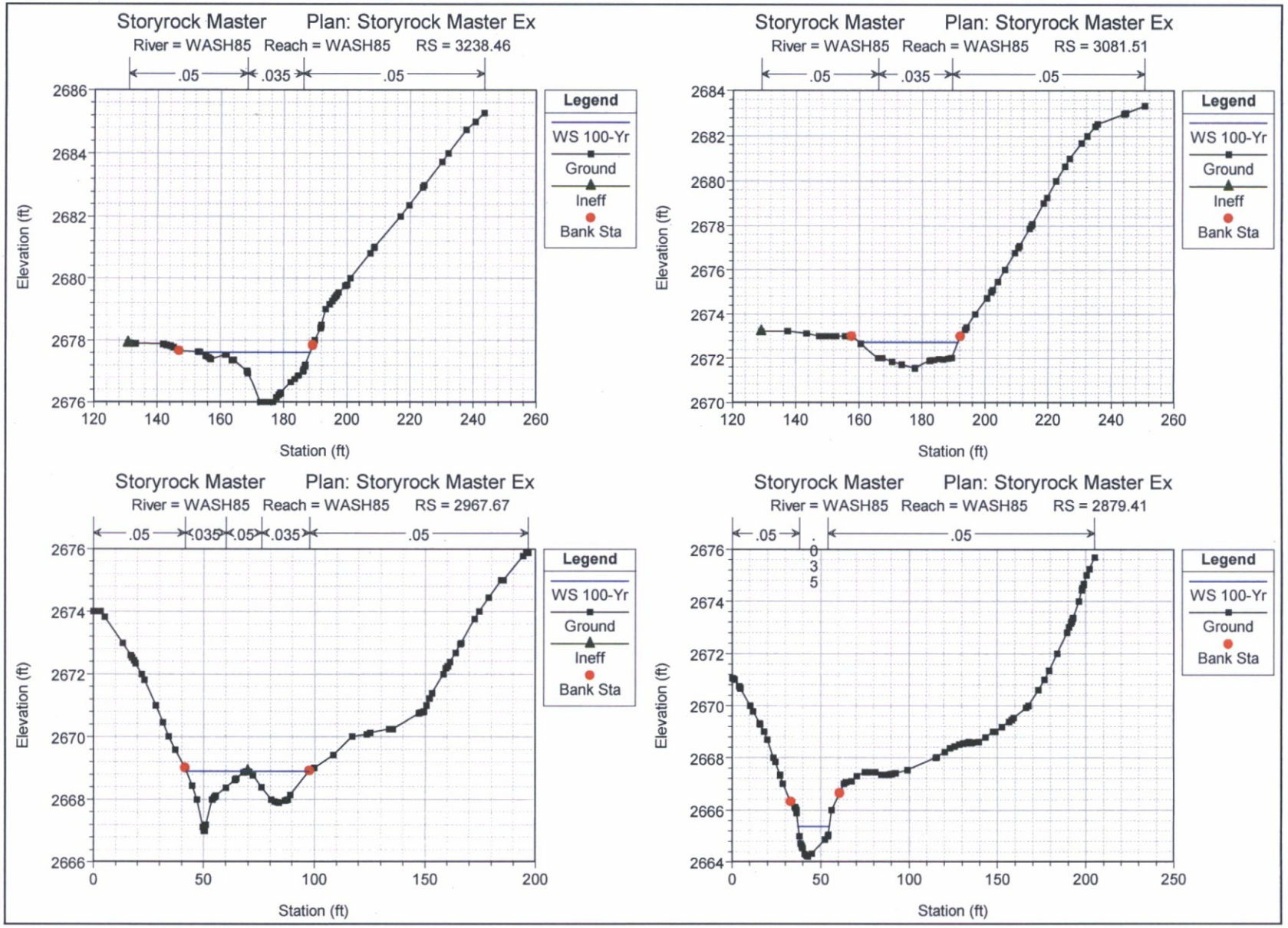

Storyrock Master Plan: Storyrock Master Ex
River = WASH80 Reach = WASH80 RS = 3439.74
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH80 Reach = WASH80 RS = 3319.74
.05
.035
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH80 Reach = WASH80 RS = 3239.73
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH80 Reach = WASH80 RS = 3048.09
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

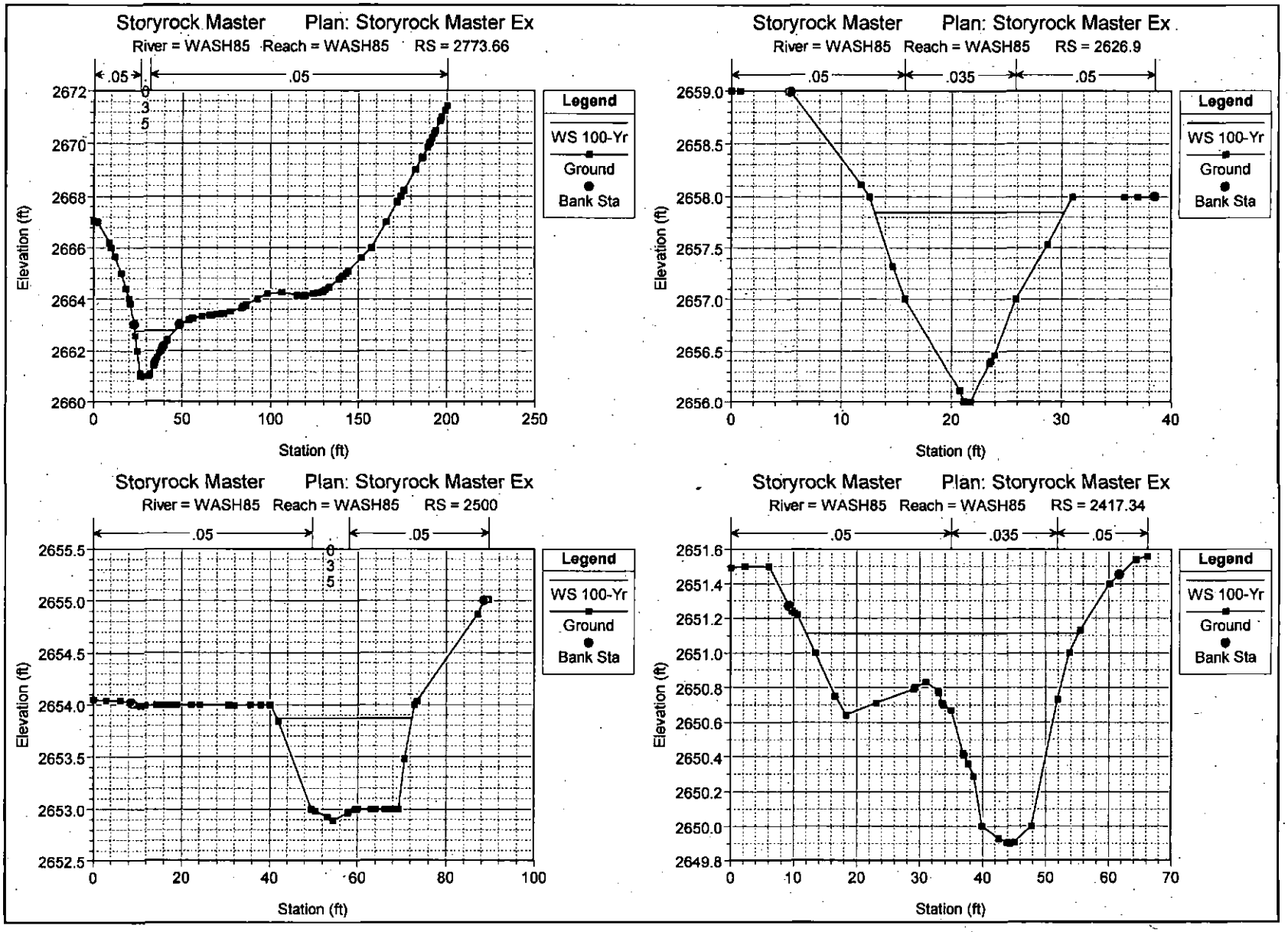

Storyrock Master Plan: Storyrock Master Ex
River = WASH80 Reach = WASH80 RS = 2743.18
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2658
2656
2654
2652
2650
2648
2646
0
50
100
150
200

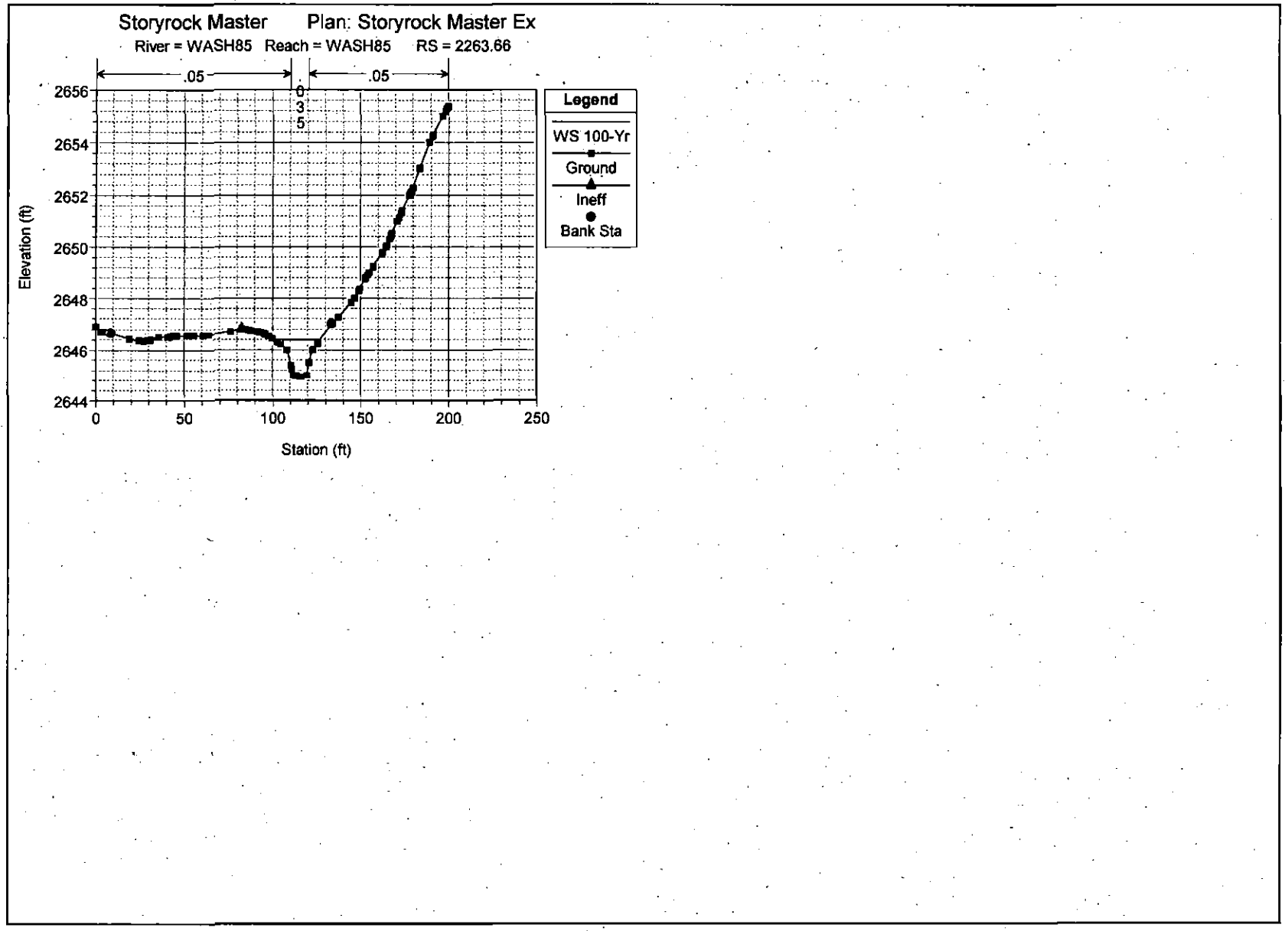

Storyrock Master Plan: Storyrock Master Ex
River = WASH80 Reach = WASH80 RS = 2491.17
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2650
2648
2646
2644
2642
2640
0
50
100
150
200

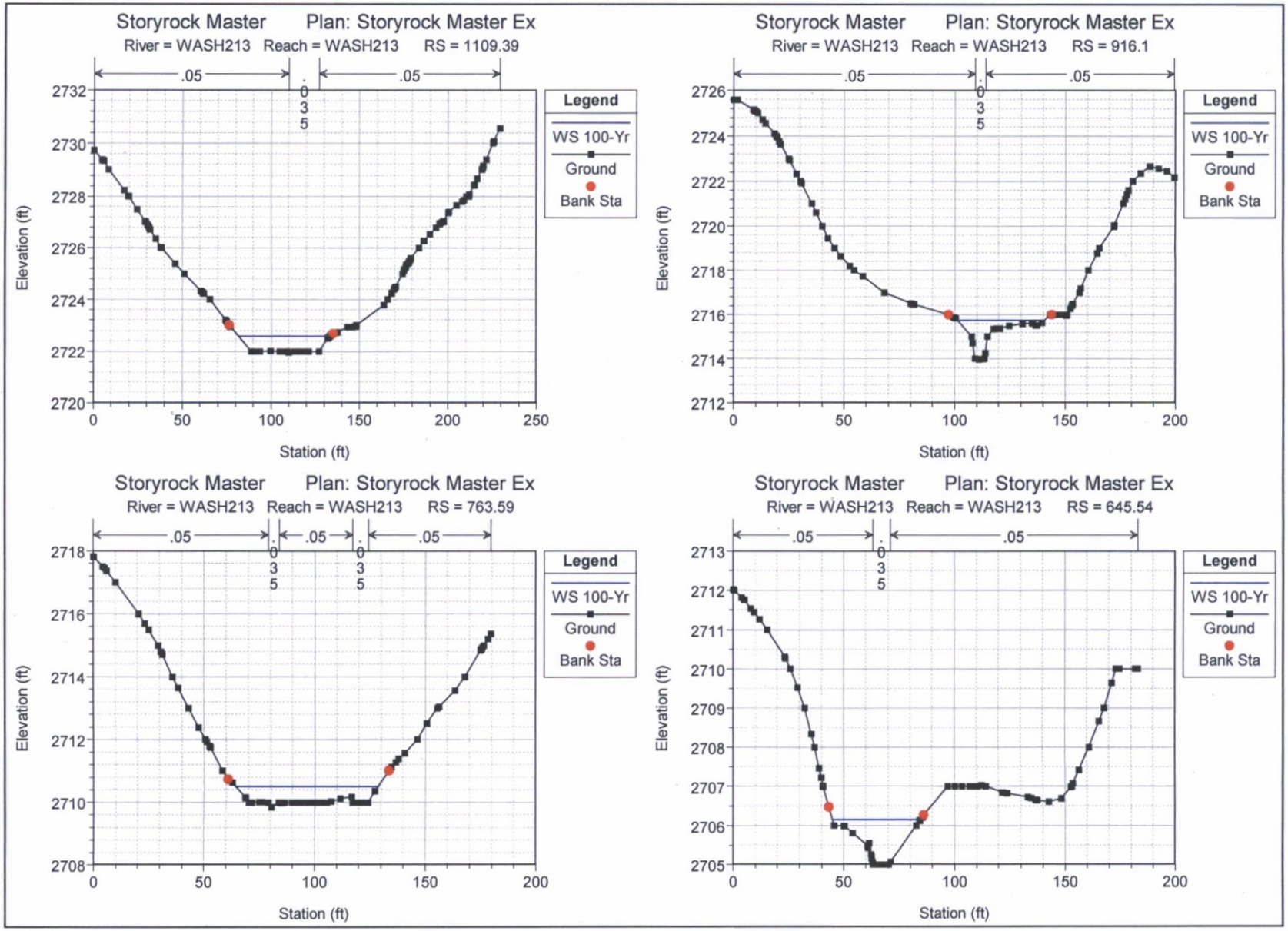

Storyrock Master Plan: Storyrock Master Ex
River = WASH80 Reach = WASH80 RS = 2092.43
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2640
2638
2636
2634
2632
2630
2628
0
50
100
150
200
250

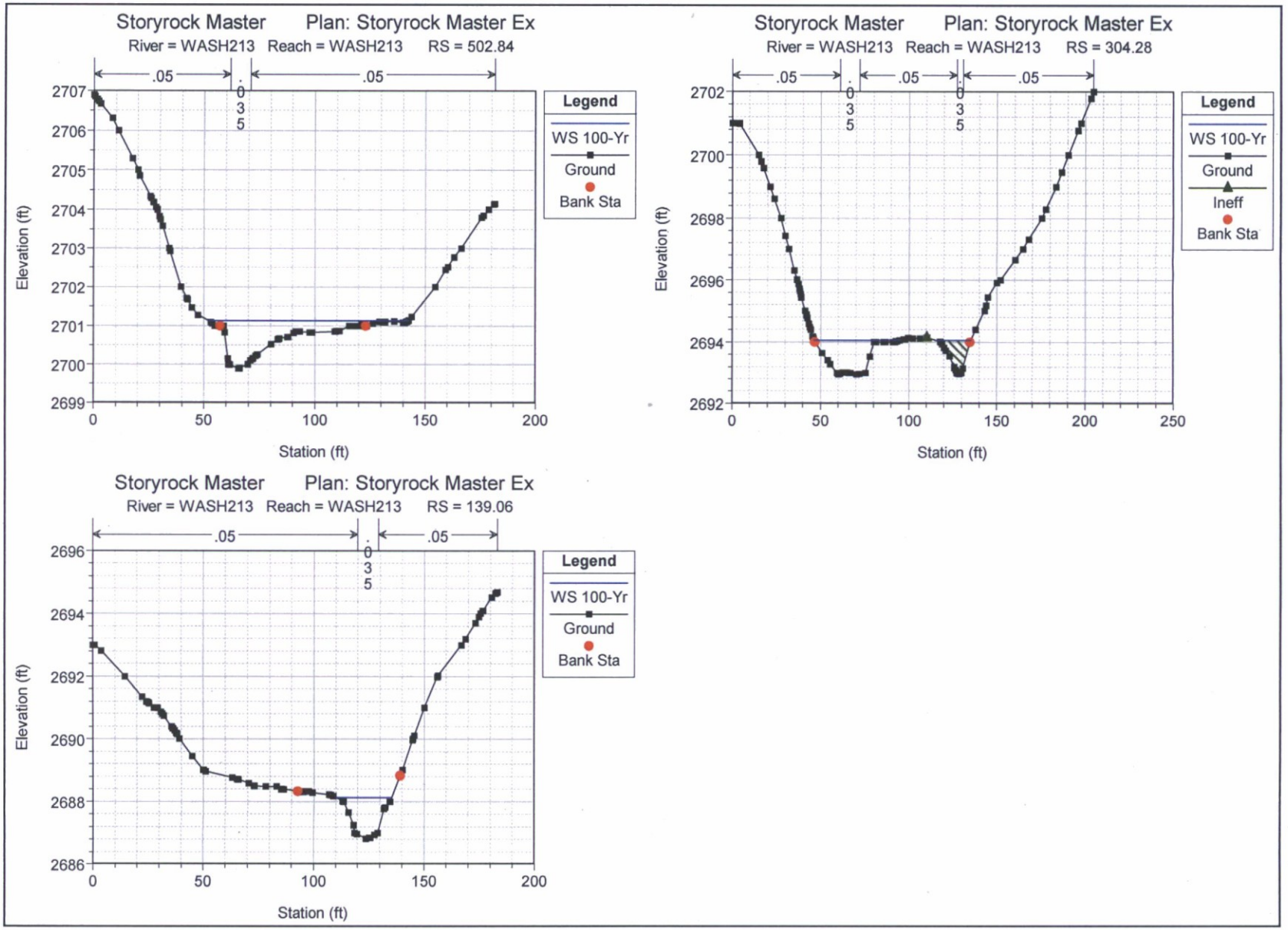

Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 3805.86
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 3694.75
.05
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 3561.36
.05
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 3382.35
.05
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

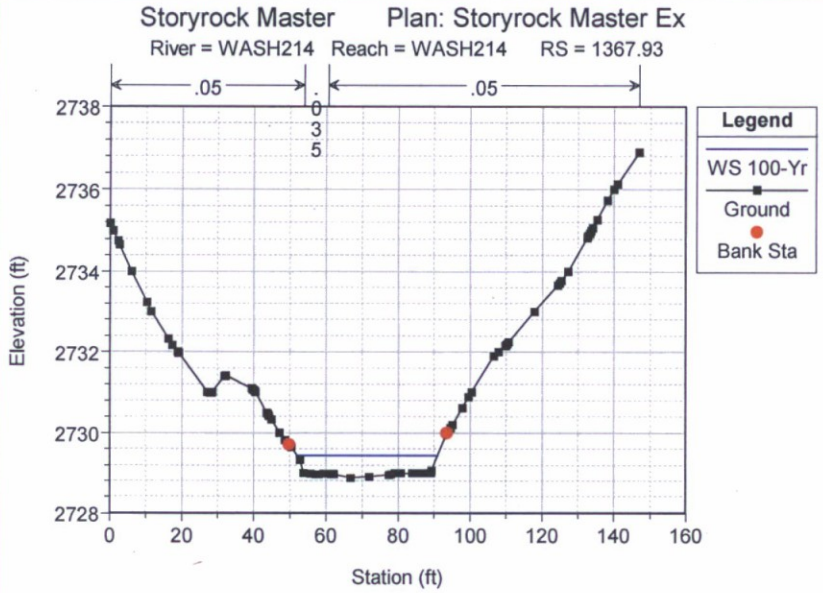

Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 3238.46
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 3081.51
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 2967.67
.05
.035
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 2879.41
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta

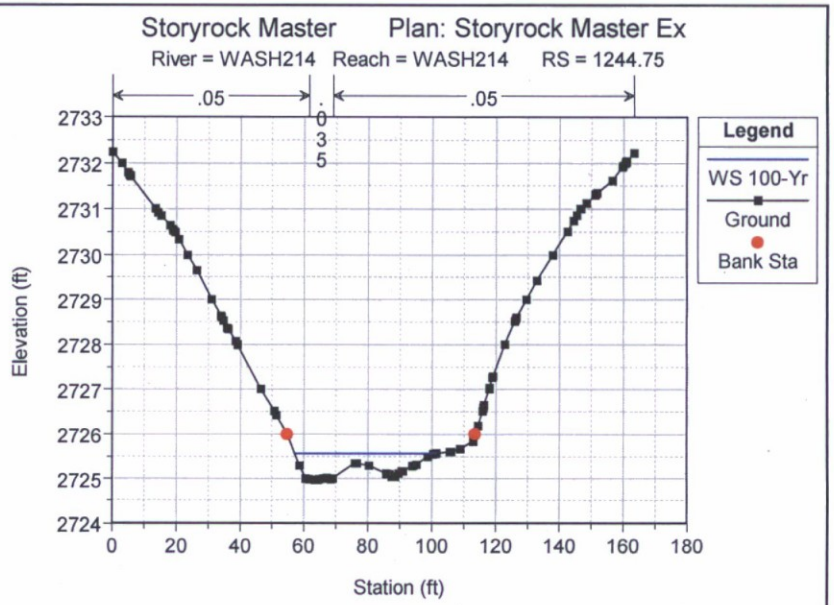

Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 2773.66
.05
.05
0
3
5
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 2626.9
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 2500
.05
.05
0
3
5
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 2417.34
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta

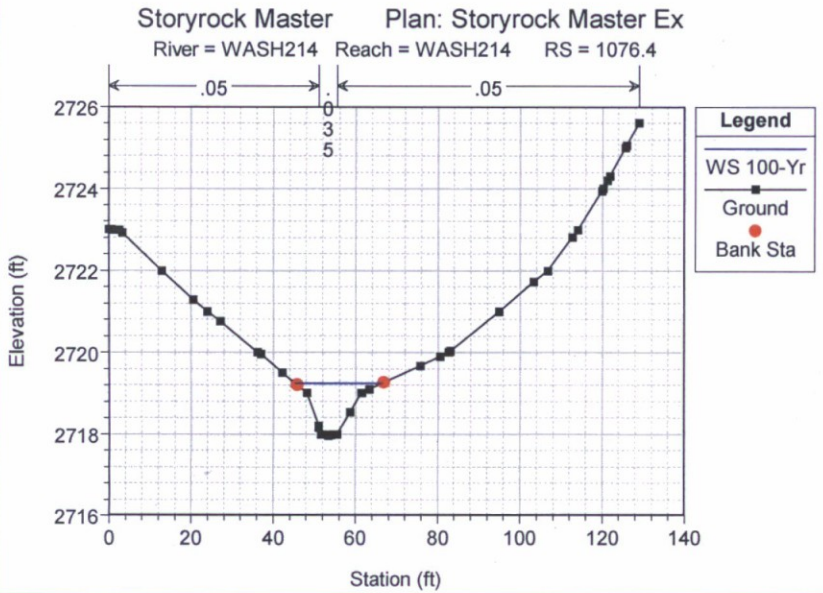

Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 2263.66
.05
.05
0
3
5
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
2656
2654
2652
2650
2648
2646
2644
0
50
100
150
200
250
Station (ft)

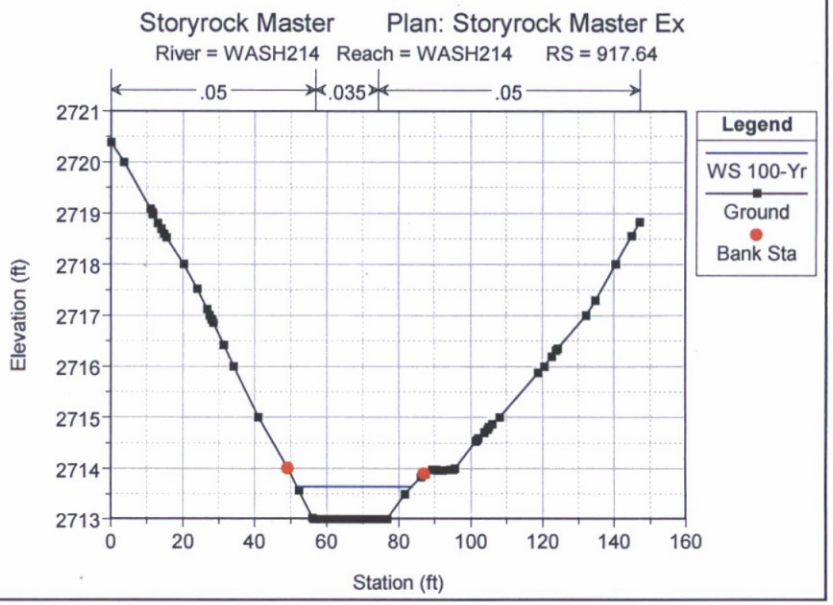

Storyrock Master Plan: Storyrock Master Ex
River = WASH213 Reach = WASH213 RS = 1109.39
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH213 Reach = WASH213 RS = 916.1
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH213 Reach = WASH213 RS = 763.59
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH213 Reach = WASH213 RS = 645.54
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

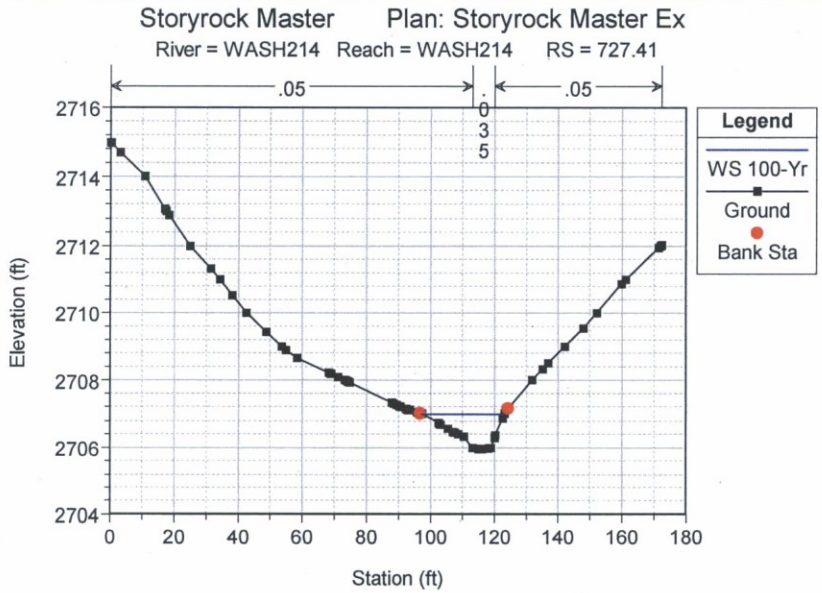

Storyrock Master Plan: Storyrock Master Ex
River = WASH213 Reach = WASH213 RS = 502.84
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH213 Reach = WASH213 RS = 304.28
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH213 Reach = WASH213 RS = 139.06
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

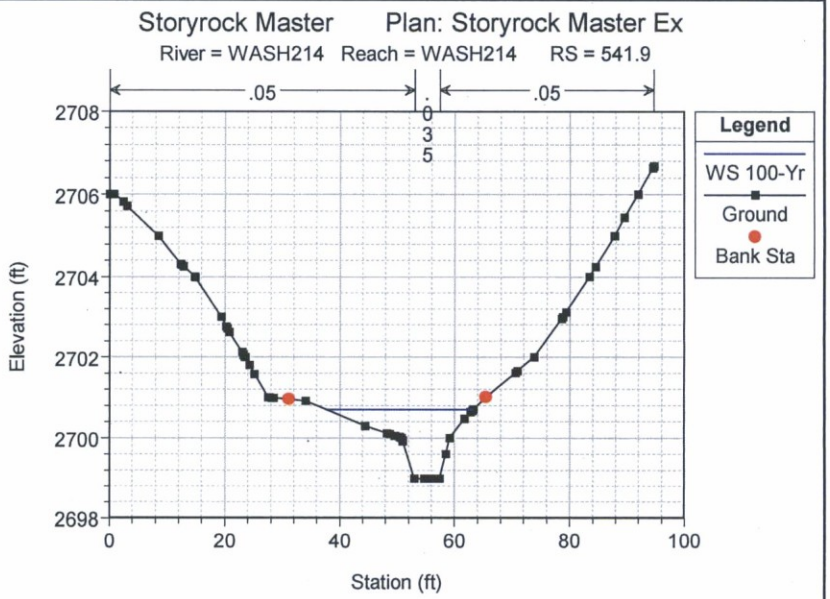

Storyrock Master Plan: Storyrock Master Ex
River = WASH214 Reach = WASH214 RS = 1367.93
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

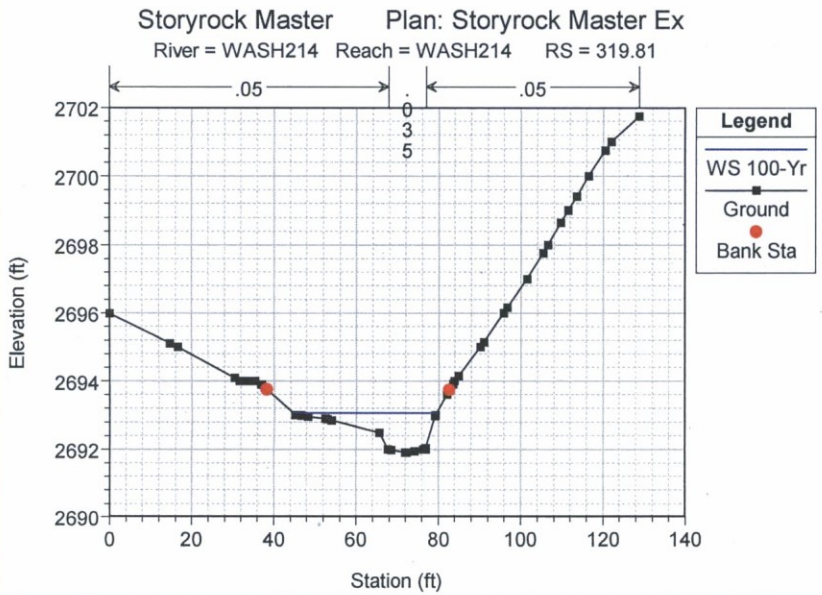

Storyrock Master Plan: Storyrock Master Ex
River = WASH214 Reach = WASH214 RS = 1244.75
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

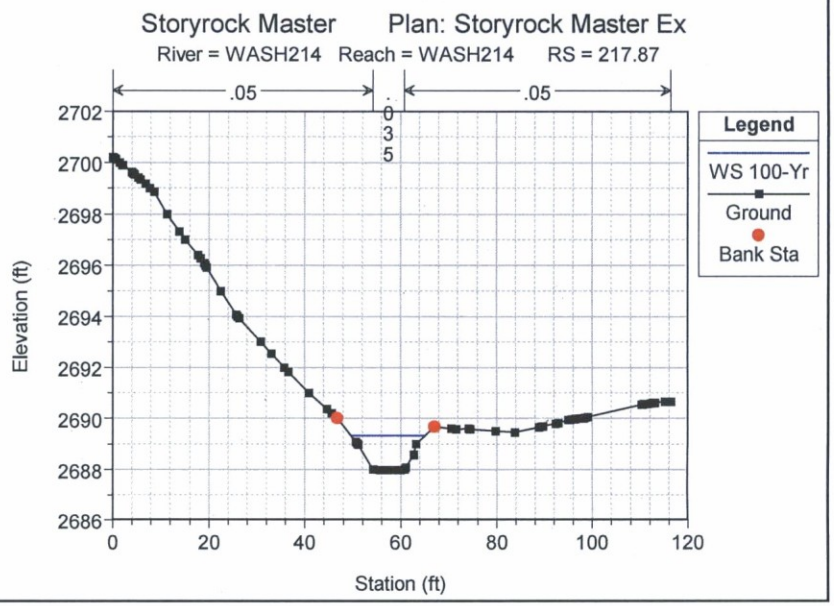

Storyrock Master Plan: Storyrock Master Ex
River = WASH214 Reach = WASH214 RS = 1076.4
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

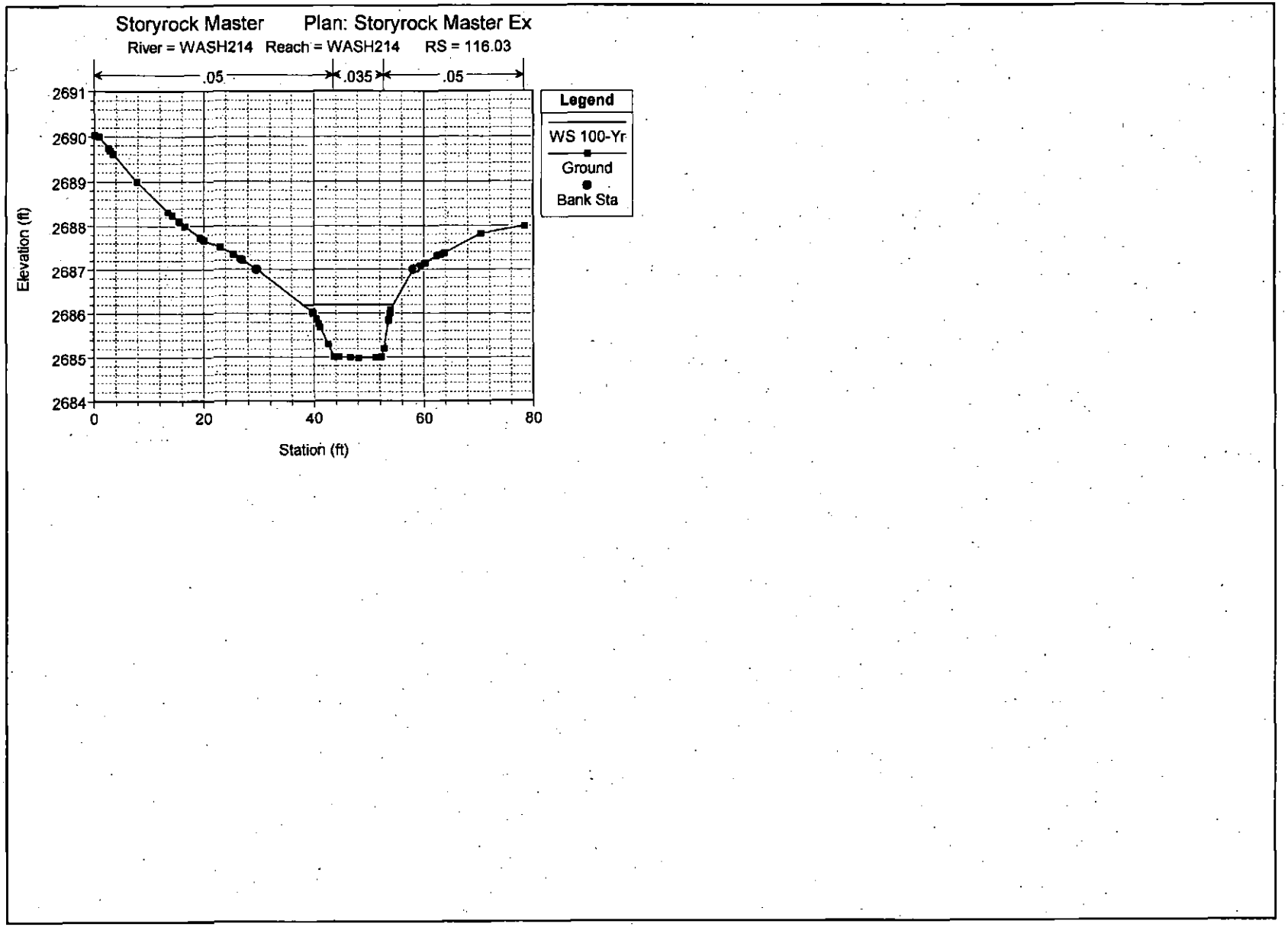

Storyrock Master Plan: Storyrock Master Ex
River = WASH214 Reach = WASH214 RS = 917.64
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

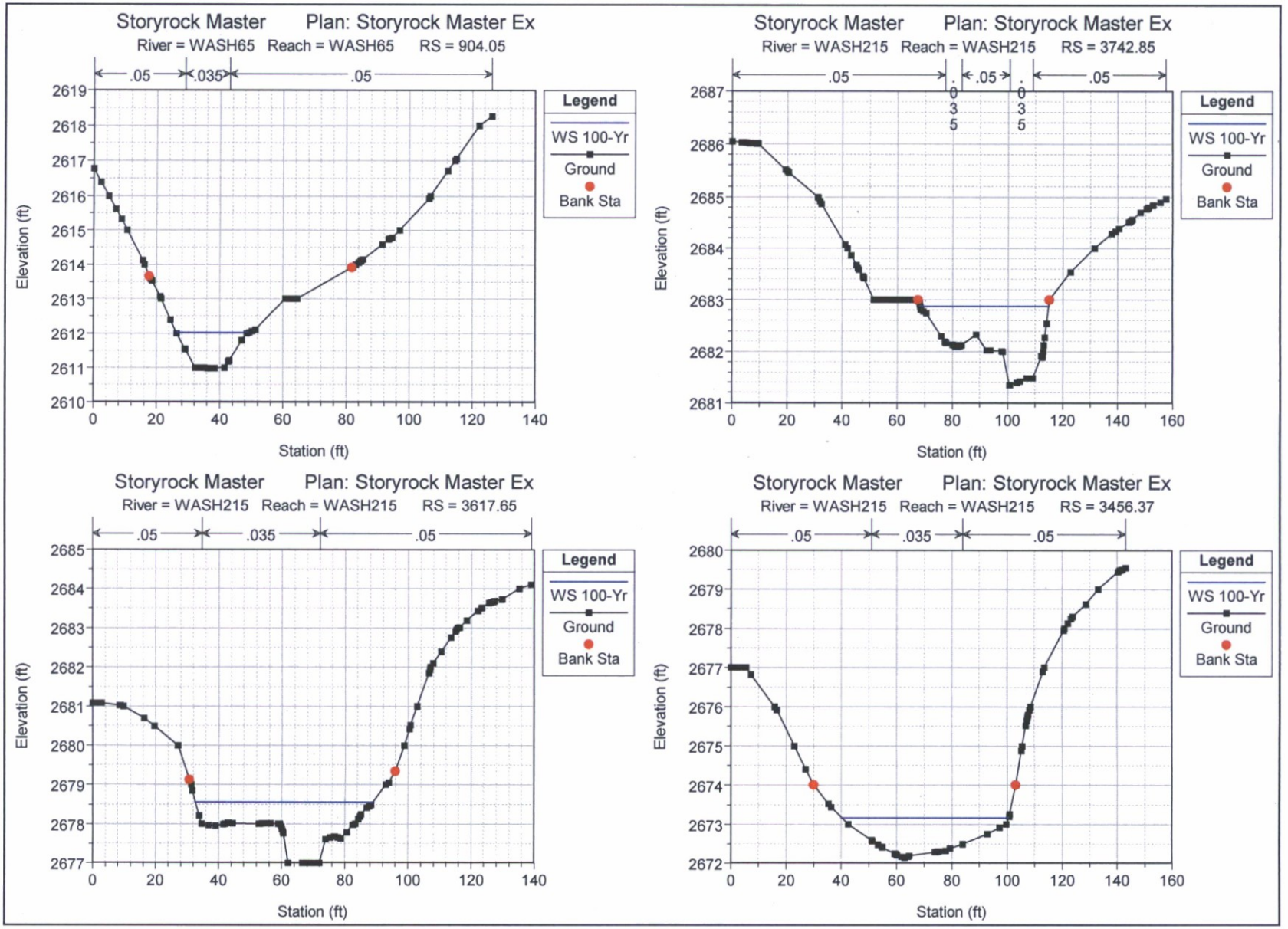

Storyrock Master Plan: Storyrock Master Ex
River = WASH214 Reach = WASH214 RS = 727.41
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

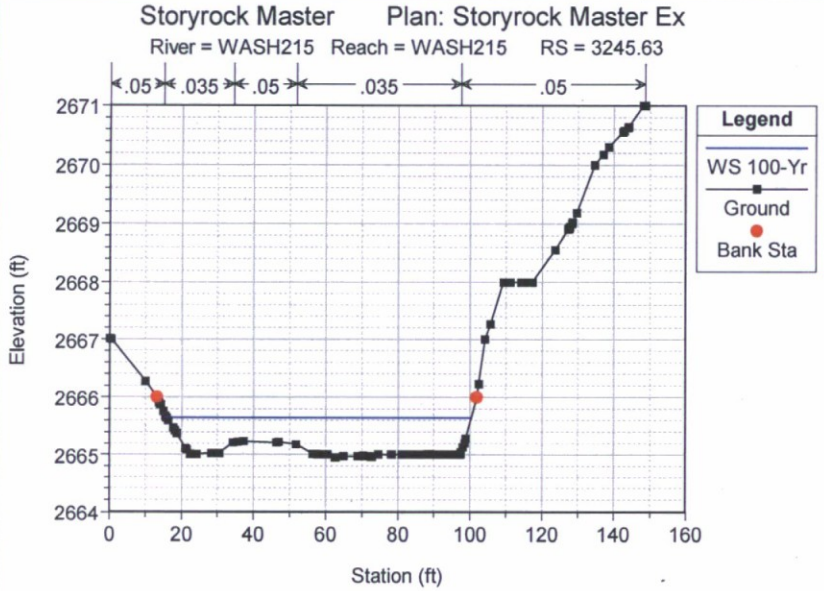

Storyrock Master Plan: Storyrock Master Ex
River = WASH214 Reach = WASH214 RS = 541.9
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

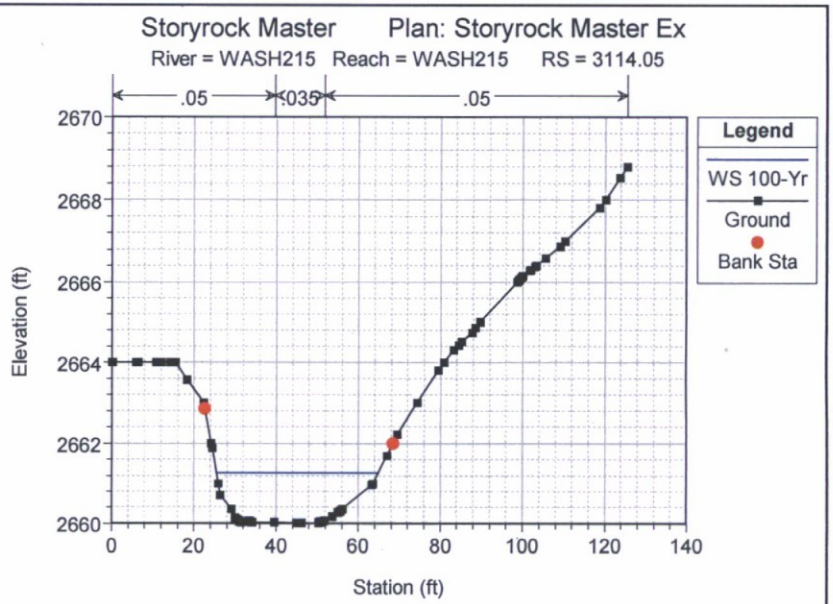

Storyrock Master Plan: Storyrock Master Ex
River = WASH214 Reach = WASH214 RS = 319.81
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

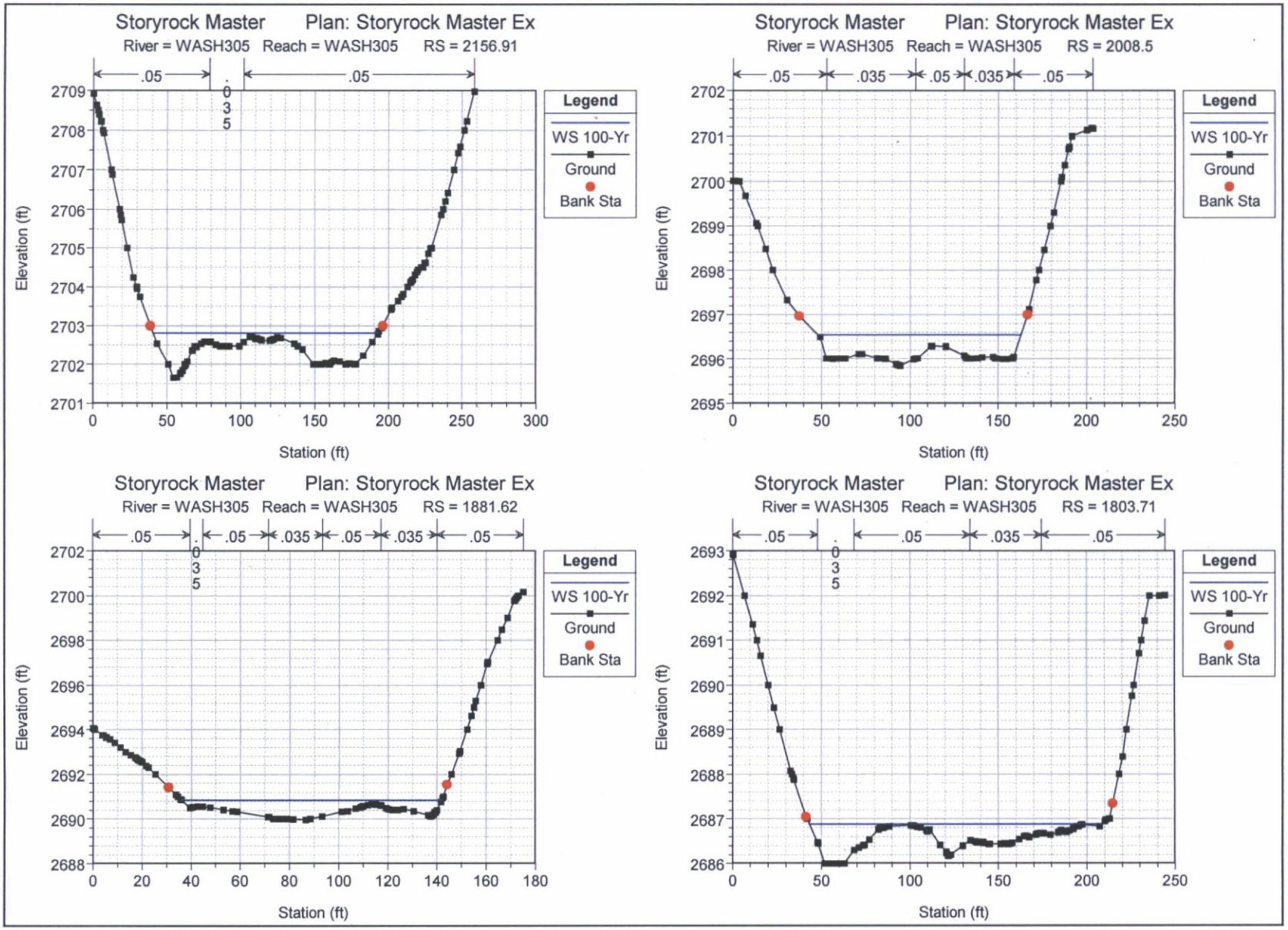

Storyrock Master Plan: Storyrock Master Ex
River = WASH214 Reach = WASH214 RS = 217.87
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Ex
River = WASH214 Reach = WASH214 RS = 116.03
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
2691
2690
2689
2688
2687
2686
2685
2684
0
20
40
60
80
Station (ft)


Storyrock Master Plan: Storyrock Master Ex
River = WASH65 Reach = WASH65 RS = 904.05
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 3742.85
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 3617.65
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 3456.37
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 3245.63
.05
.035
.05
.035
.05
Elevation (ft)
2671
2670
2669
2668
2667
2666
2665
2664
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta


Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 3114.05
.05
.035
.05
Elevation (ft)
2670
2668
2666
2664
2662
2660
0
20
40
60
80
100
120
140
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta


Storyrock Master Plan: Storyrock Master Ex
River = WASH305 Reach = WASH305 RS = 2156.91
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH305 Reach = WASH305 RS = 2008.5
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH305 Reach = WASH305 RS = 1881.62
.05
.035
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH305 Reach = WASH305 RS = 1803.71
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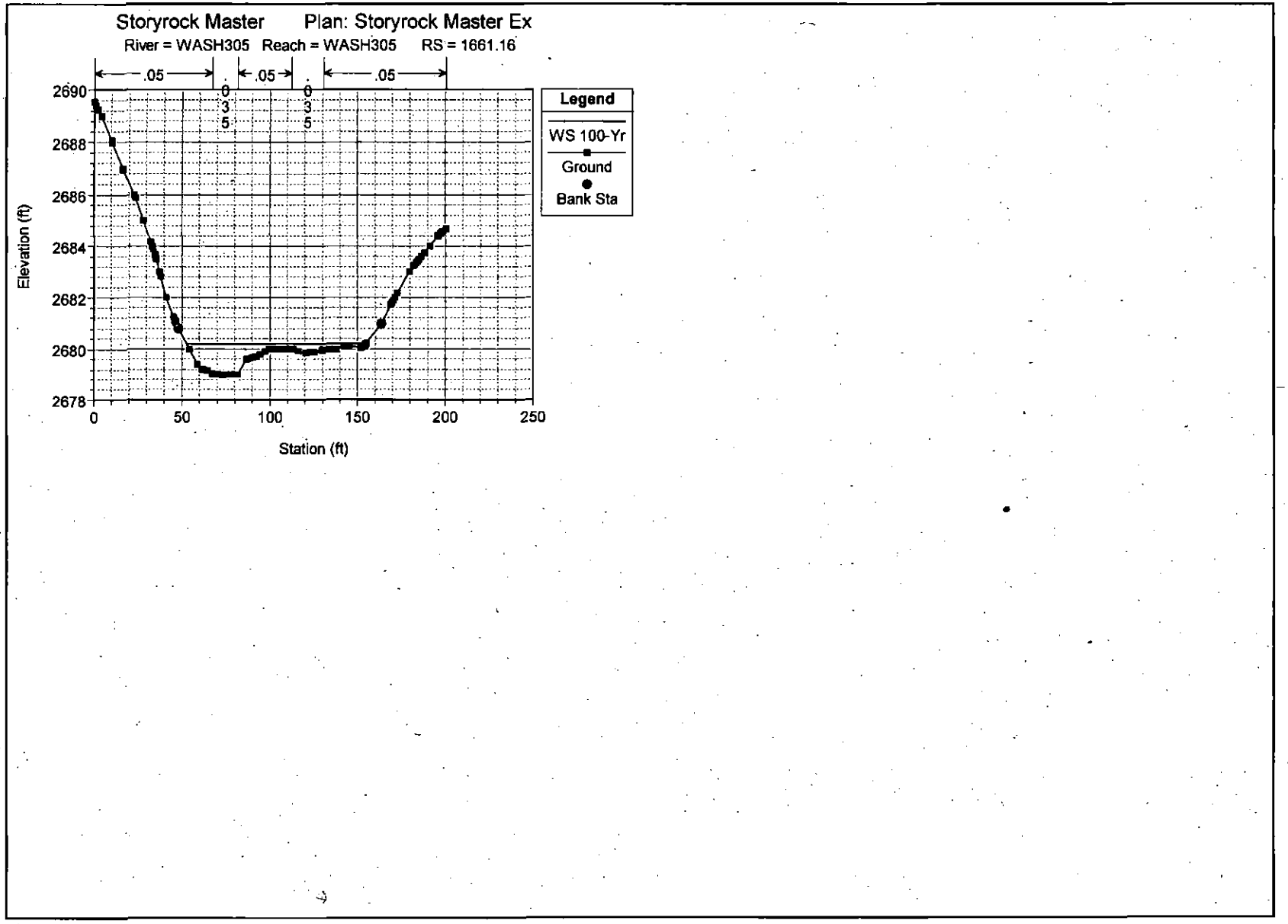
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Ex
River = WASH305 Reach = WASH305 RS = 1661.16
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.05
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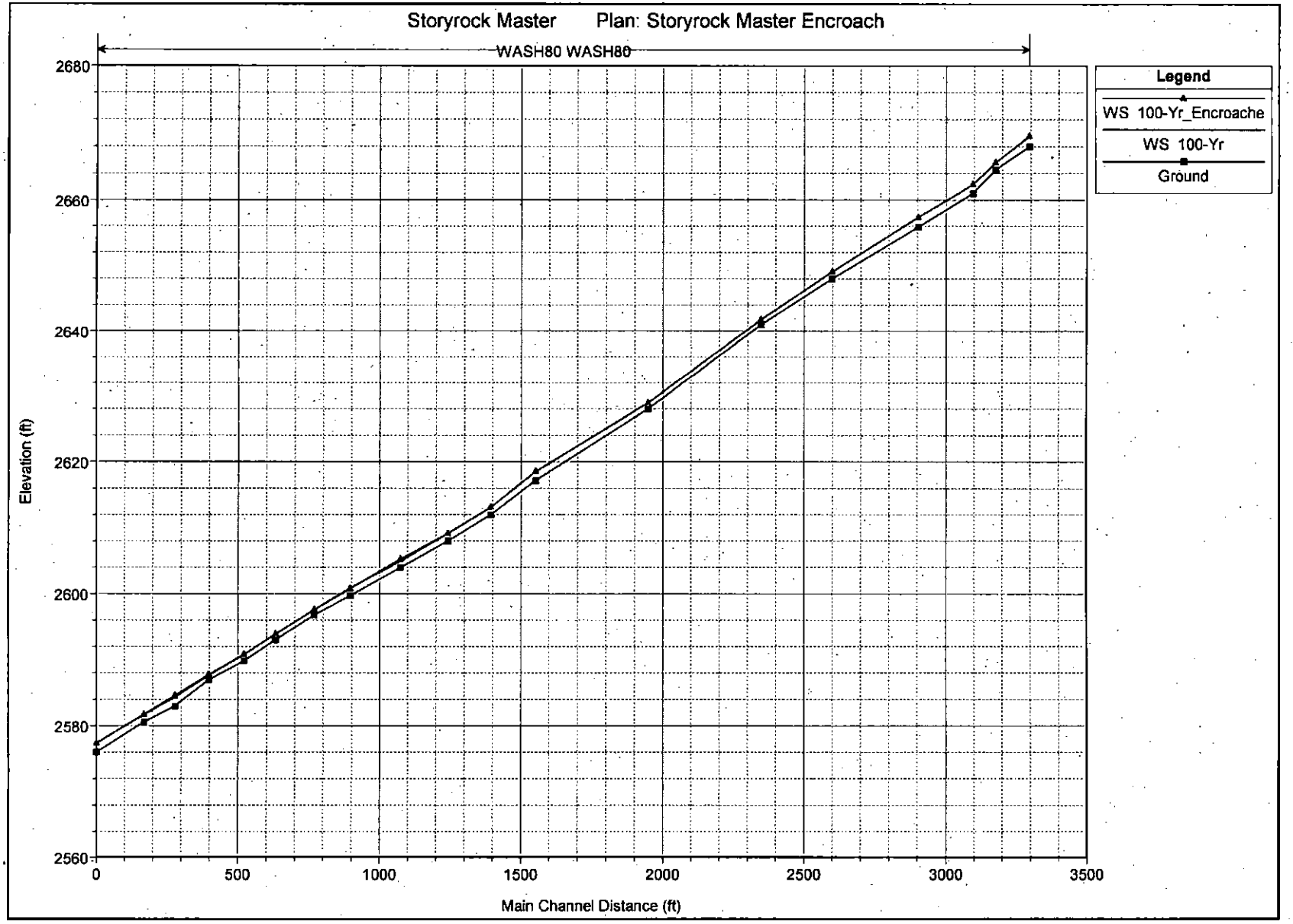
0.035
0.035
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
2690
2688
2686
2684
2682
2680
2678
0
50
100
150
200
250
Station (ft)

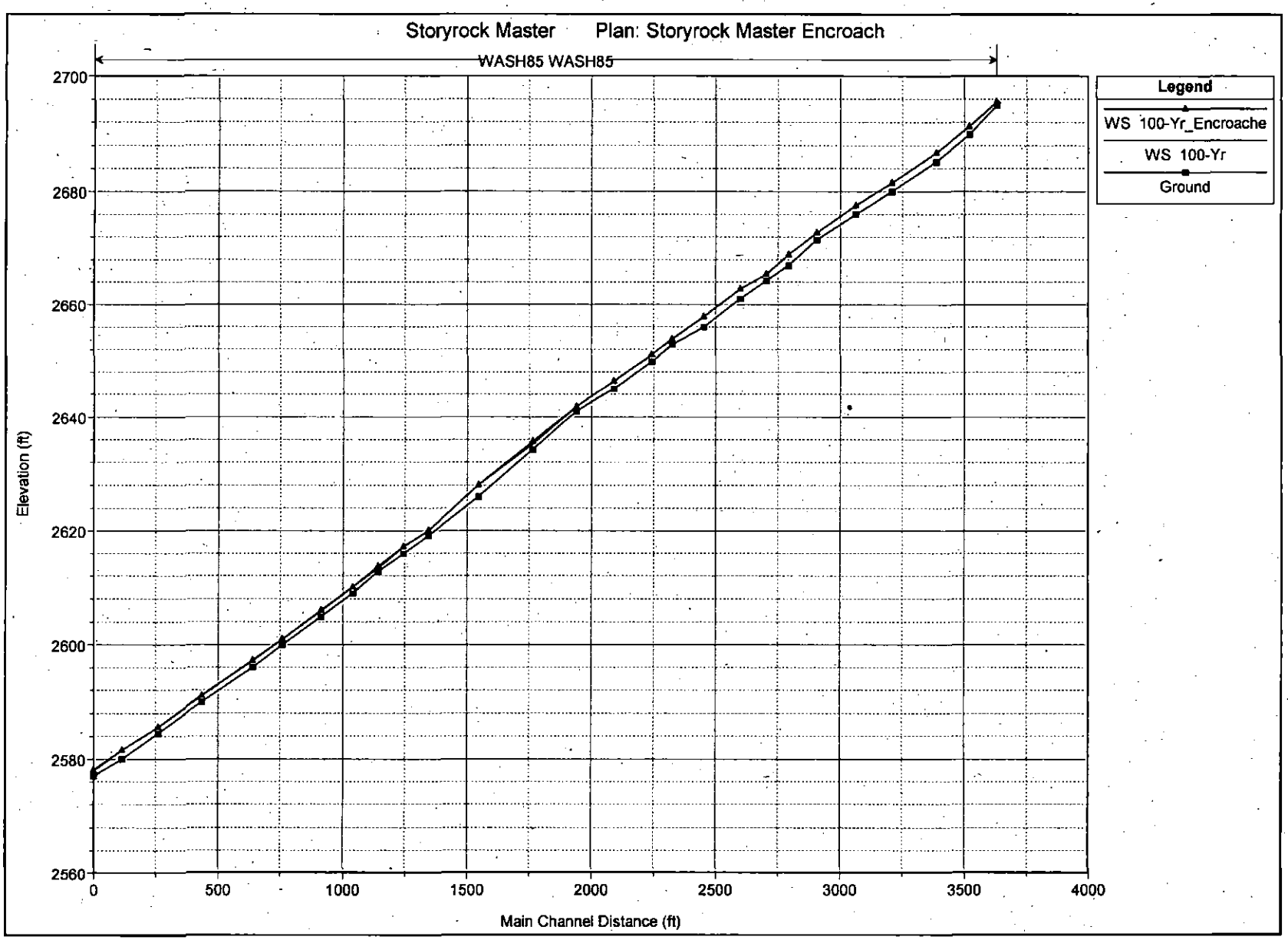
HEC-RAS Plan: Ex Locations: User Defined Profile: 100-Yr

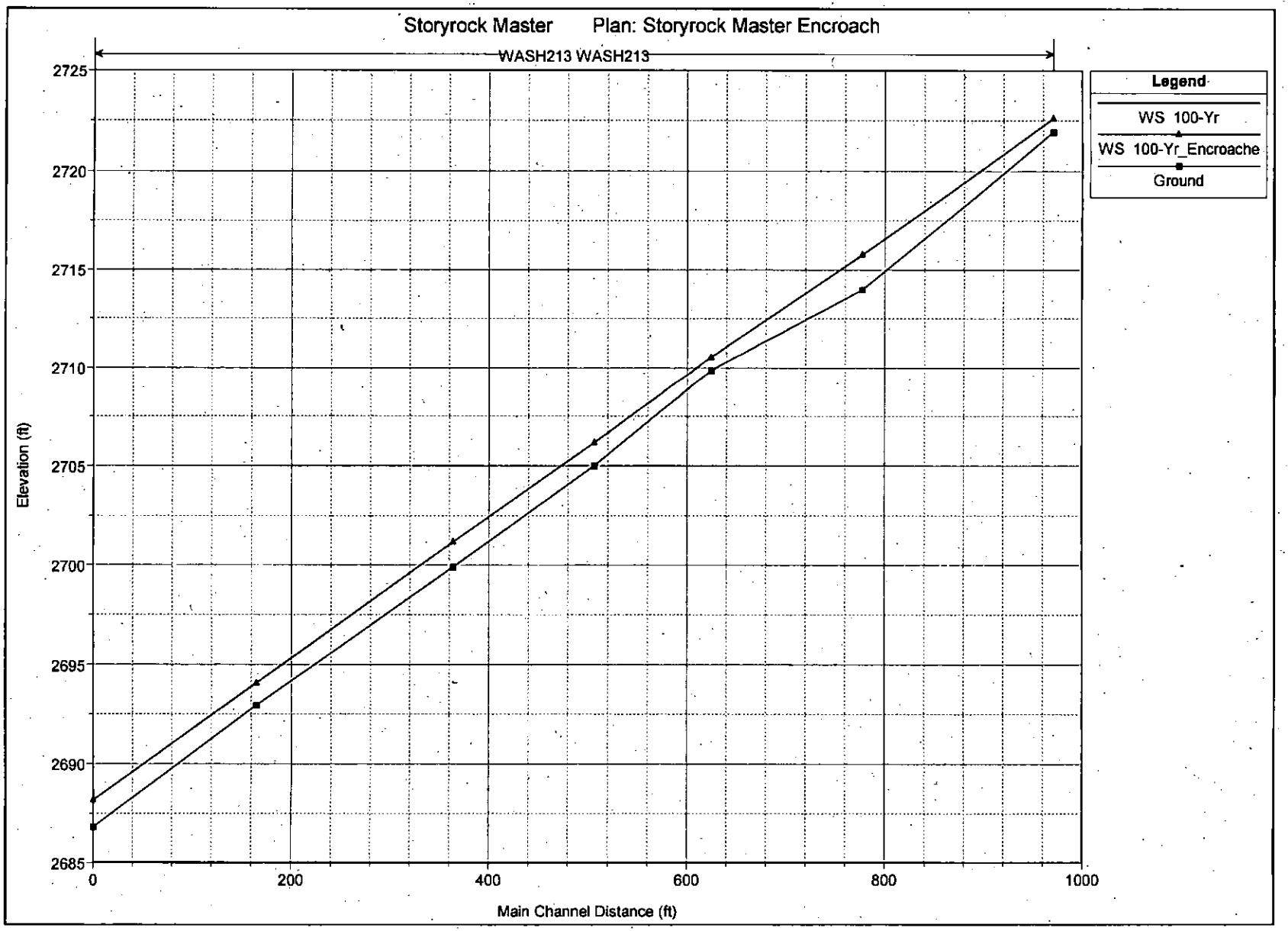
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
WASH80	WASH80	3439.74	100-Yr	69.00	2668.00	2669.59	2669.72	2670.23	0.037910	6.43	10.74	12.36	1.22
WASH80	WASH80	3319.74	100-Yr	69.00	2664.55	2665.68	2665.79	2666.17	0.029773	5.61	12.31	23.18	1.17
WASH80	WASH80	3239.73	100-Yr	69.00	2660.98	2662.37	2662.61	2663.24	0.044781	7.49	9.21	10.31	1.40
WASH80	WASH80	3048.09	100-Yr	69.00	2655.91	2657.39	2657.42	2657.88	0.018479	5.63	12.26	13.94	1.06
WASH80	WASH80	2743.18	100-Yr	129.00	2647.99	2649.17	2649.33	2649.73	0.033615	6.02	21.44	35.23	1.36
WASH80	WASH80	2491.17	100-Yr	129.00	2640.97	2641.82	2641.88	2642.19	0.026452	4.87	26.49	46.66	1.14
WASH80	WASH80	2092.43	100-Yr	129.00	2628.00	2628.94	2628.99	2629.21	0.040838	4.13	31.23	81.75	1.18
WASH85	WASH85	3805.86	100-Yr	87.00	2694.99	2695.57	2695.67	2695.98	0.035645	5.10	17.05	35.97	1.31
WASH85	WASH85	3694.75	100-Yr	87.00	2689.88	2691.12	2691.41	2692.00	0.035032	7.53	11.56	17.72	1.64
WASH85	WASH85	3561.36	100-Yr	87.00	2685.13	2686.61	2686.69	2687.16	0.036123	5.96	14.60	17.75	1.16
WASH85	WASH85	3382.35	100-Yr	130.00	2680.00	2681.48	2681.64	2682.16	0.023832	6.61	19.66	22.88	1.26
WASH85	WASH85	3238.46	100-Yr	130.00	2676.00	2677.62	2677.66	2678.02	0.032415	5.08	25.61	34.85	1.04
WASH85	WASH85	3081.51	100-Yr	130.00	2671.56	2672.73	2672.78	2673.19	0.029180	5.40	24.08	31.44	1.09
WASH85	WASH85	2967.67	100-Yr	130.00	2666.99	2668.91	2668.91	2669.12	0.012310	3.72	34.91	55.51	0.83
WASH85	WASH85	2879.41	100-Yr	130.00	2664.22	2665.38	2665.80	2666.78	0.077635	9.49	13.69	17.59	1.90
WASH85	WASH85	2773.66	100-Yr	130.00	2660.98	2662.78	2662.78	2663.28	0.032922	5.70	22.81	22.79	1.00
WASH85	WASH85	2626.9	100-Yr	130.00	2656.00	2657.85	2658.17	2658.76	0.028494	7.65	16.98	17.26	1.36
WASH85	WASH85	2500	100-Yr	130.00	2652.89	2653.87	2654.09	2654.40	0.039686	5.81	22.36	30.70	1.20
WASH85	WASH85	2417.34	100-Yr	130.00	2649.90	2651.11	2651.22	2651.56	0.029500	5.39	24.13	43.26	1.27
WASH85	WASH85	2263.66	100-Yr	130.00	2644.94	2646.39	2646.62	2647.13	0.027938	6.92	18.77	34.36	1.44
WASH213	WASH213	1109.39	100-Yr	120.00	2721.94	2722.60	2722.63	2722.91	0.037502	4.46	26.89	51.90	1.09
WASH213	WASH213	916.1	100-Yr	120.00	2713.97	2715.75	2715.91	2716.29	0.031290	5.89	20.37	39.50	1.45
WASH213	WASH213	763.59	100-Yr	120.00	2709.84	2710.51	2710.52	2710.77	0.040982	4.03	29.80	64.75	1.05
WASH213	WASH213	645.54	100-Yr	120.00	2705.00	2706.16	2706.22	2706.56	0.031097	5.09	23.59	39.83	1.17
WASH213	WASH213	502.84	100-Yr	120.00	2699.90	2701.13	2701.11	2701.33	0.033549	3.58	34.61	90.57	0.89
WASH213	WASH213	304.28	100-Yr	120.00	2692.95	2694.06	2694.06	2694.34	0.036934	4.27	28.14	68.75	0.98
WASH213	WASH213	139.06	100-Yr	120.00	2686.81	2688.13	2688.37	2688.77	0.030534	6.45	18.61	25.17	1.32
WASH214	WASH214	1367.93	100-Yr	57.00	2728.88	2729.44	2729.38	2729.60	0.028053	3.20	17.82	39.16	0.84
WASH214	WASH214	1244.75	100-Yr	57.00	2724.98	2725.58	2725.57	2725.76	0.034899	3.43	16.61	44.29	0.99
WASH214	WASH214	1076.4	100-Yr	57.00	2717.97	2719.25	2719.25	2719.56	0.038775	4.48	12.74	21.22	1.00
WASH214	WASH214	917.64	100-Yr	80.00	2713.00	2713.64	2713.71	2714.00	0.032719	4.77	16.77	31.98	1.16
WASH214	WASH214	727.41	100-Yr	80.00	2705.95	2707.00	2707.11	2707.45	0.036136	5.40	14.81	25.79	1.26
WASH214	WASH214	541.9	100-Yr	80.00	2698.99	2700.70	2700.64	2700.99	0.031267	4.35	18.37	25.60	0.91
WASH214	WASH214	319.81	100-Yr	80.00	2691.90	2693.07	2693.06	2693.34	0.038214	4.17	19.18	35.04	0.99
WASH214	WASH214	217.87	100-Yr	80.00	2687.97	2689.34	2689.34	2689.82	0.030970	5.52	14.50	15.63	1.01
WASH214	WASH214	116.03	100-Yr	80.00	2684.98	2686.20	2686.23	2686.68	0.030875	5.53	14.46	16.57	1.04
WASH215	WASH215	3742.85	100-Yr	238.00	2681.34	2682.89	2682.97	2683.45	0.042612	5.99	39.72	46.70	1.15
WASH215	WASH215	3617.65	100-Yr	238.00	2677.00	2678.57	2678.59	2679.01	0.029518	5.37	44.35	56.33	1.07
WASH215	WASH215	3456.37	100-Yr	238.00	2672.15	2673.18	2673.32	2673.76	0.035944	6.12	38.88	60.55	1.35
WASH215	WASH215	3245.63	100-Yr	238.00	2664.95	2665.66	2665.72	2666.04	0.036760	4.99	47.72	84.79	1.17
WASH215	WASH215	3114.05	100-Yr	238.00	2660.01	2661.27	2661.31	2661.83	0.027944	6.02	39.55	39.48	1.06
WASH305	WASH305	2156.91	100-Yr	283.00	2701.65	2702.81	2702.83	2703.06	0.045504	4.00	70.67	152.06	1.04
WASH305	WASH305	2008.5	100-Yr	283.00	2695.85	2696.55	2696.65	2696.97	0.042503	5.20	54.40	114.91	1.33
WASH305	WASH305	1881.62	100-Yr	283.00	2689.97	2690.86	2690.92	2691.24	0.047936	4.97	56.94	105.99	1.20
WASH305	WASH305	1803.71	100-Yr	283.00	2686.00	2686.89	2687.00	2687.30	0.053537	5.09	55.55	165.34	1.55
WASH305	WASH305	1661.16	100-Yr	283.00	2678.98	2680.20	2680.34	2680.72	0.040115	5.77	49.01	101.90	1.47

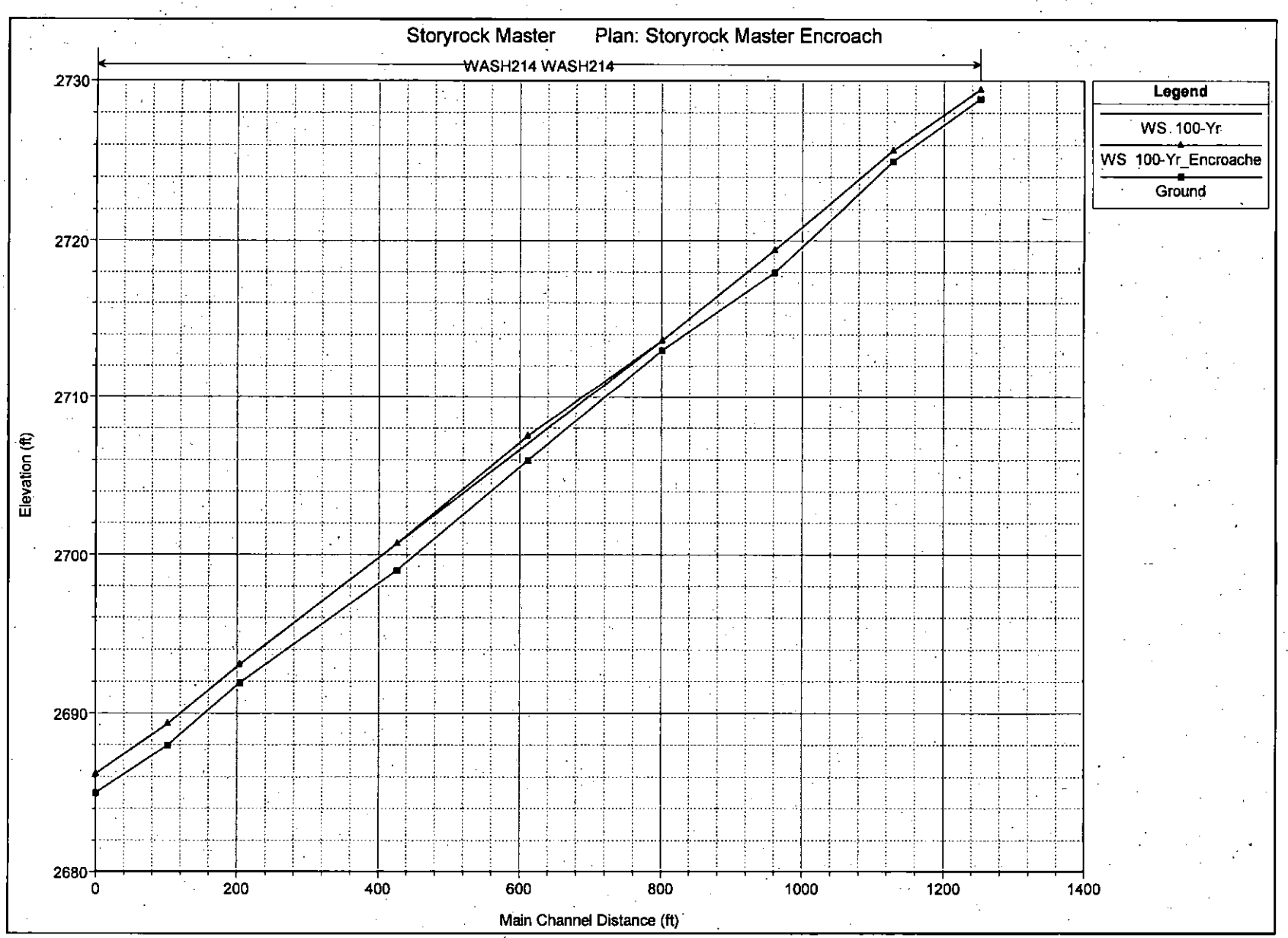
O SITE BOUNDARY CROSS SECTION

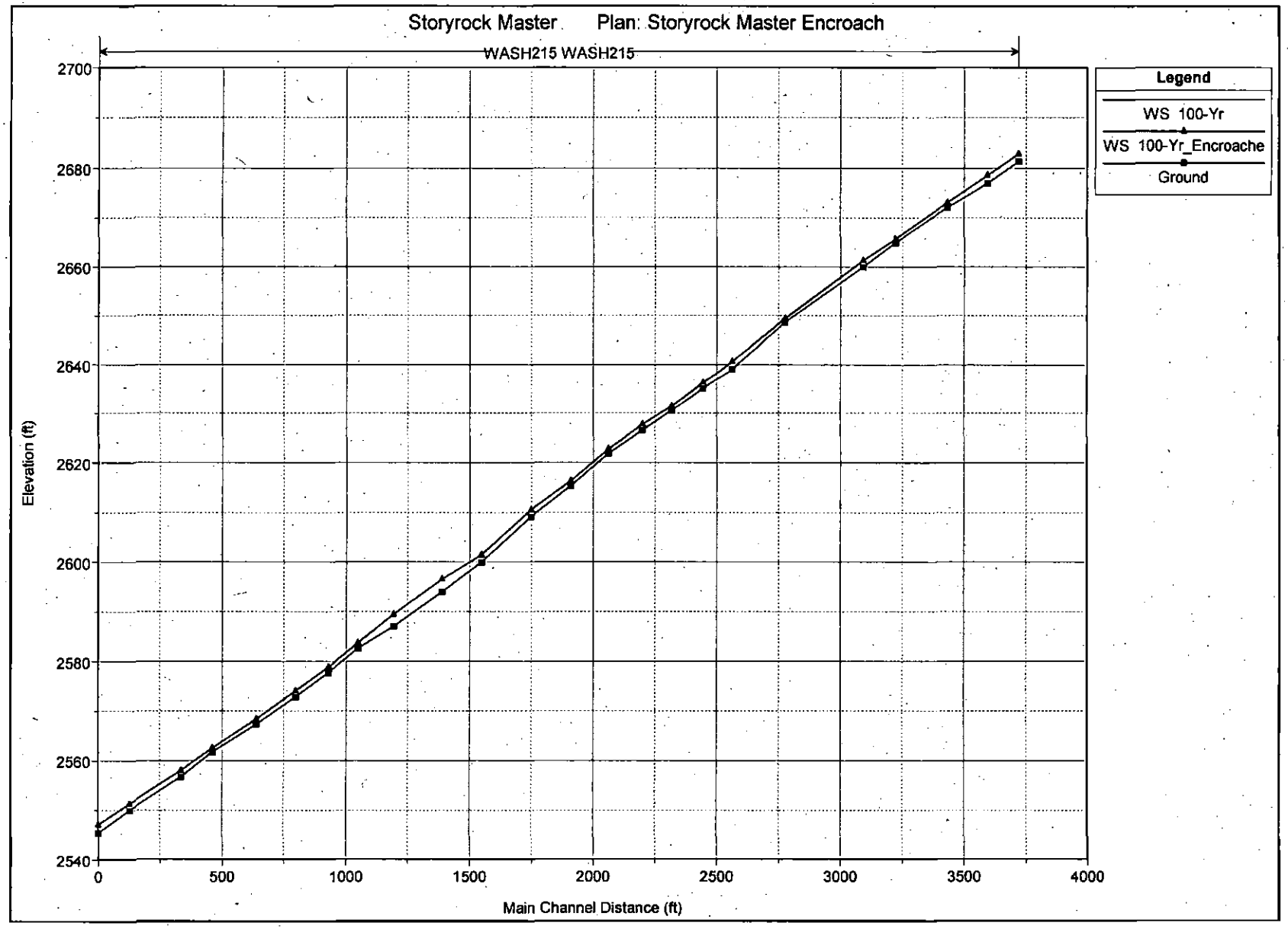
HEC-RAS Proposed Condition

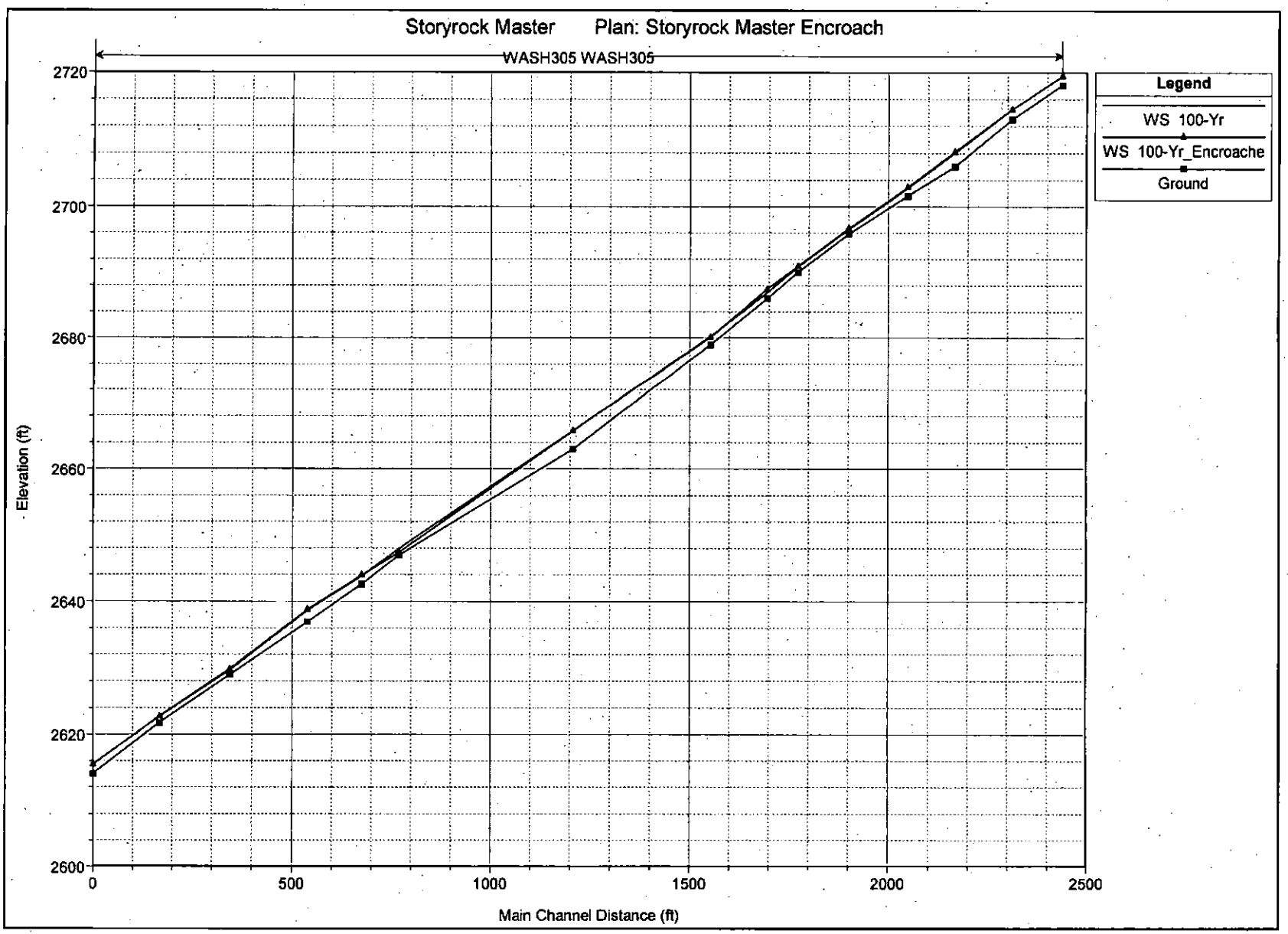

Storyrock Master Plan: Storyrock Master Encroach
WASH80 WASH80
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Elevation (ft)
2680
2660
2640
2620
2600
2580
2560
0
500
1000
1500
2000
2500
3000
3500
Main Channel Distance (ft)


Storyrock Master Plan: Storyrock Master Encroach
WASH85 WASH85
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Elevation (ft)
2700
2680
2660
2640
2620
2600
2580
2560
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)


Storyrock Master Plan: Storyrock Master Encroach
WASH213 WASH213
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Elevation (ft)
2725
2720
2715
2710
2705
2700
2695
2690
2685
0
200
400
600
800
1000
Main Channel Distance (ft)


Storyrock Master Plan: Storyrock Master Encroach
WASH214 WASH214
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Elevation (ft)
2730
2720
2710
2700
2690
2680
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)


Storyrock Master Plan: Storyrock Master Encroach
WASH215 WASH215
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Elevation (ft)
2700
2680
2660
2640
2620
2600
2580
2560
2540
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)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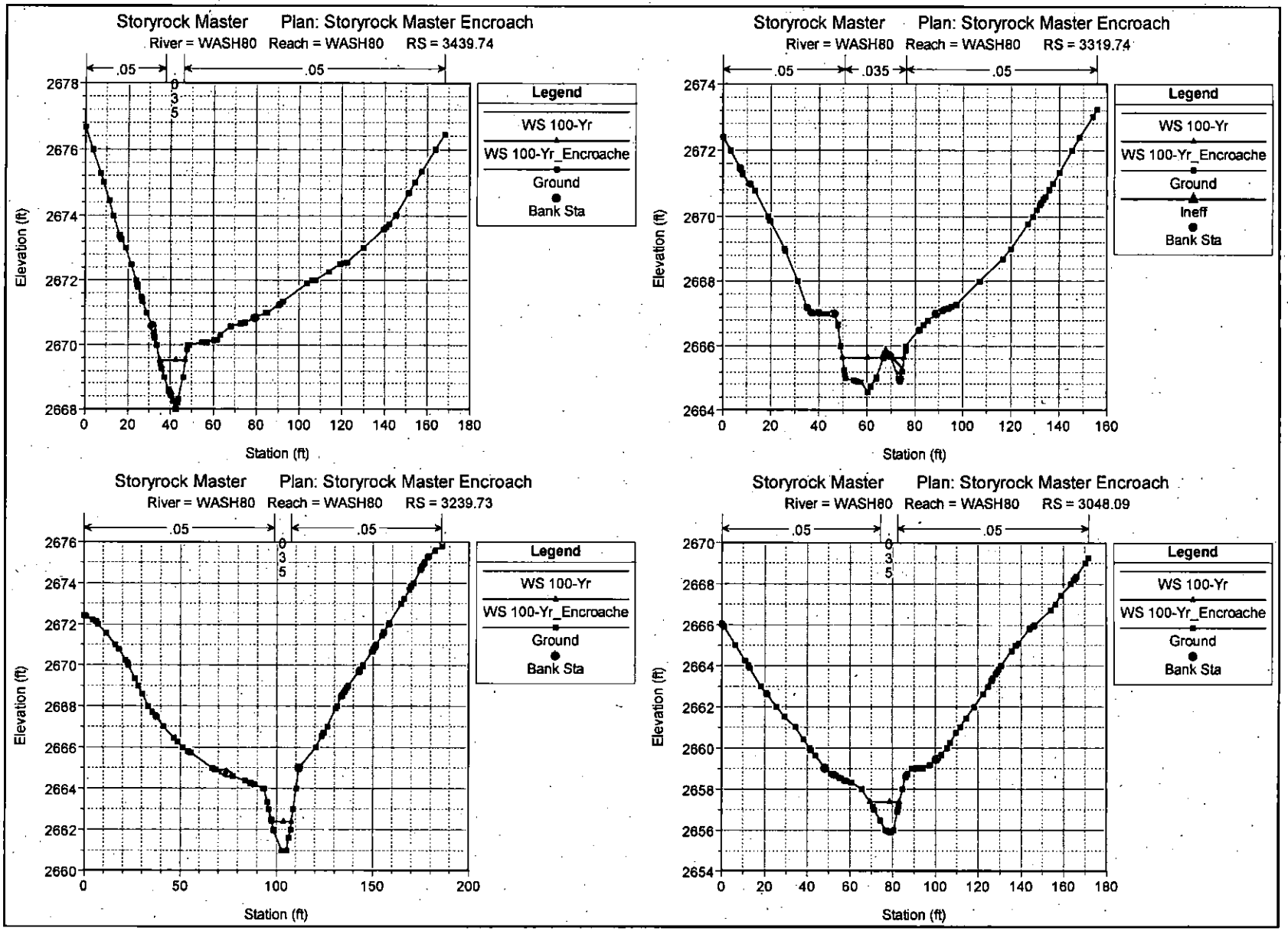
WASH305 WASH305
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Elevation (ft)
2720
2700
2680
2660
2640
2620
2600
0
500
1000
1500
2000
2500
Main Channel Distance (ft)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River = WASH80 Reach = WASH80 RS = 3439.74
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.05
0.035
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH80 Reach = WASH80 RS = 3319.74
.05
.035
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH80 Reach = WASH80 RS = 3239.73
.05
.05
0.035
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH80 Reach = WASH80 RS = 3048.09
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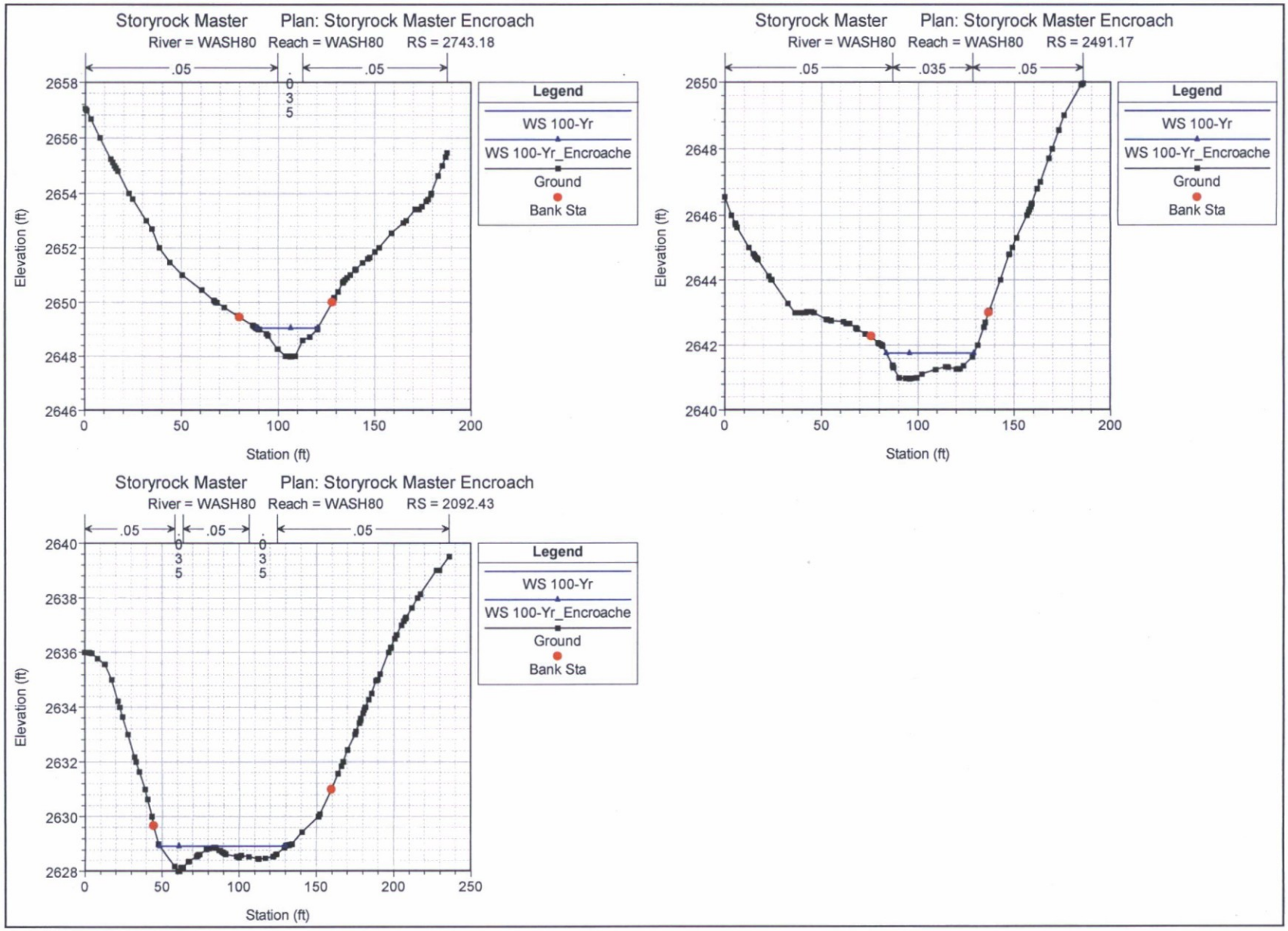
.05
0.035
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)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River = WASH80 Reach = WASH80 RS = 2743.18
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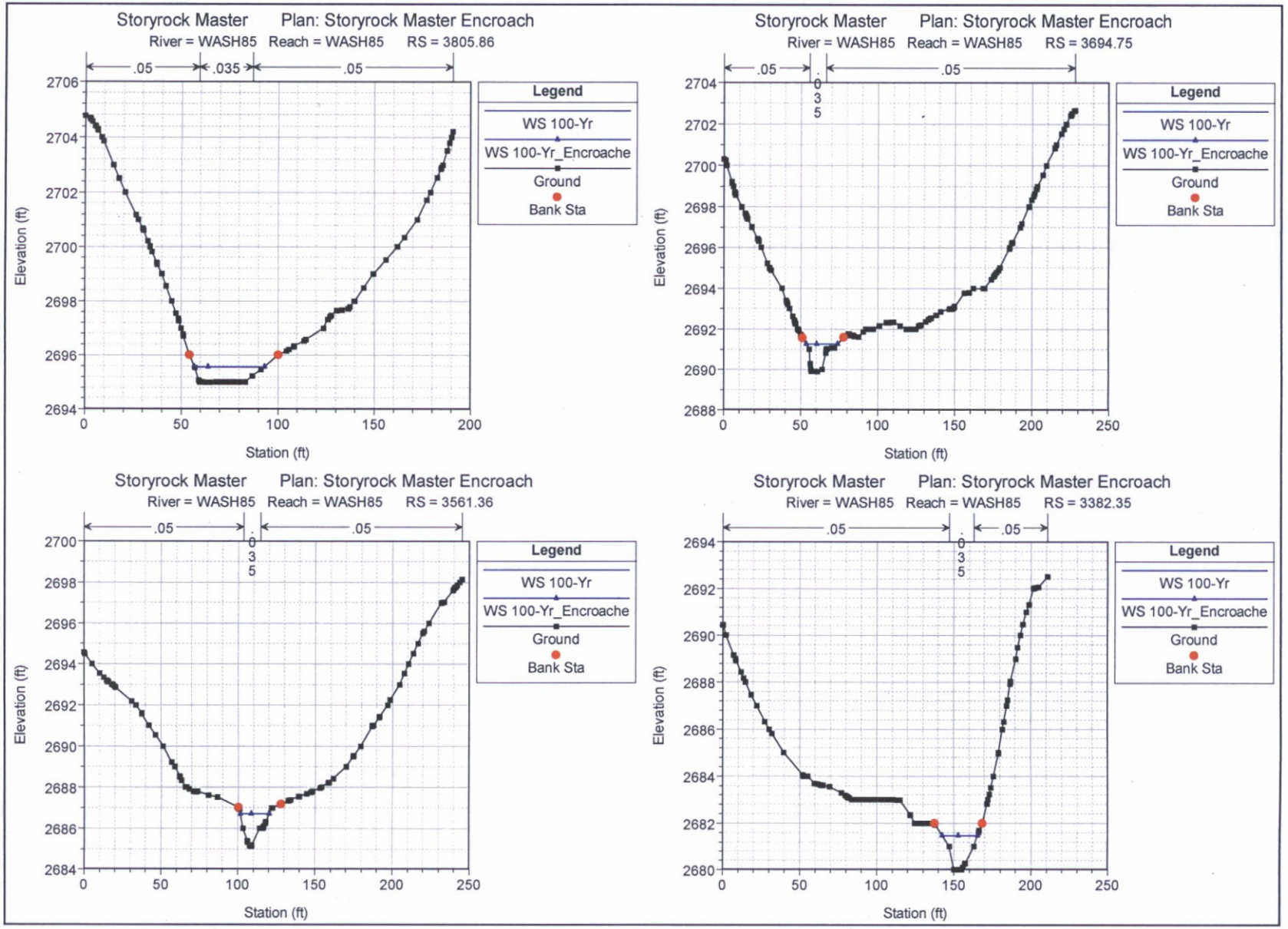
.035
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH80 Reach = WASH80 RS = 2491.17
.05
.035
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH80 Reach = WASH80 RS = 2092.43
.05
.035
.05
.035
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 3805.86
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.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 3694.75
.05
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 3561.36
.05
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 3382.35
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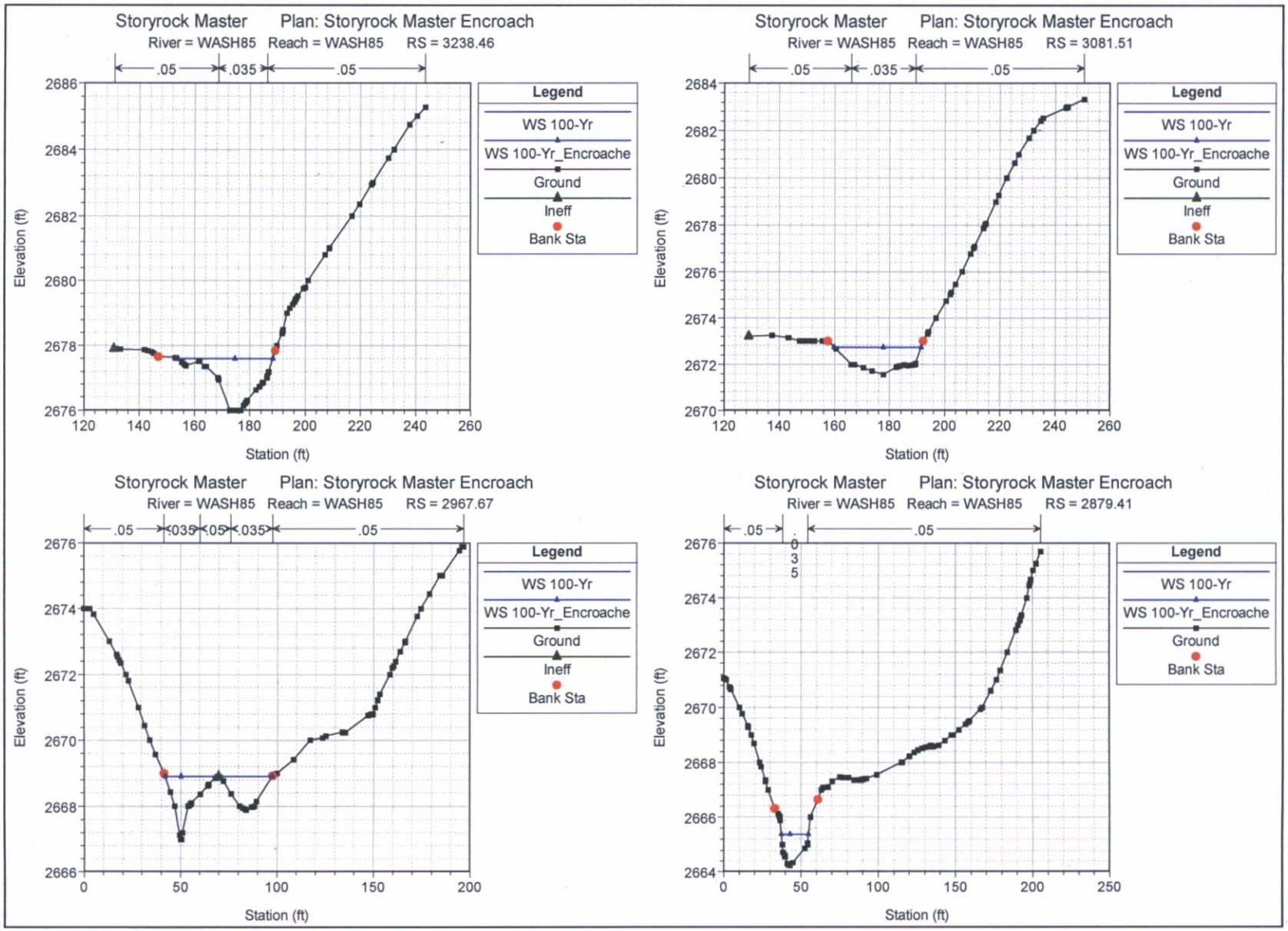
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta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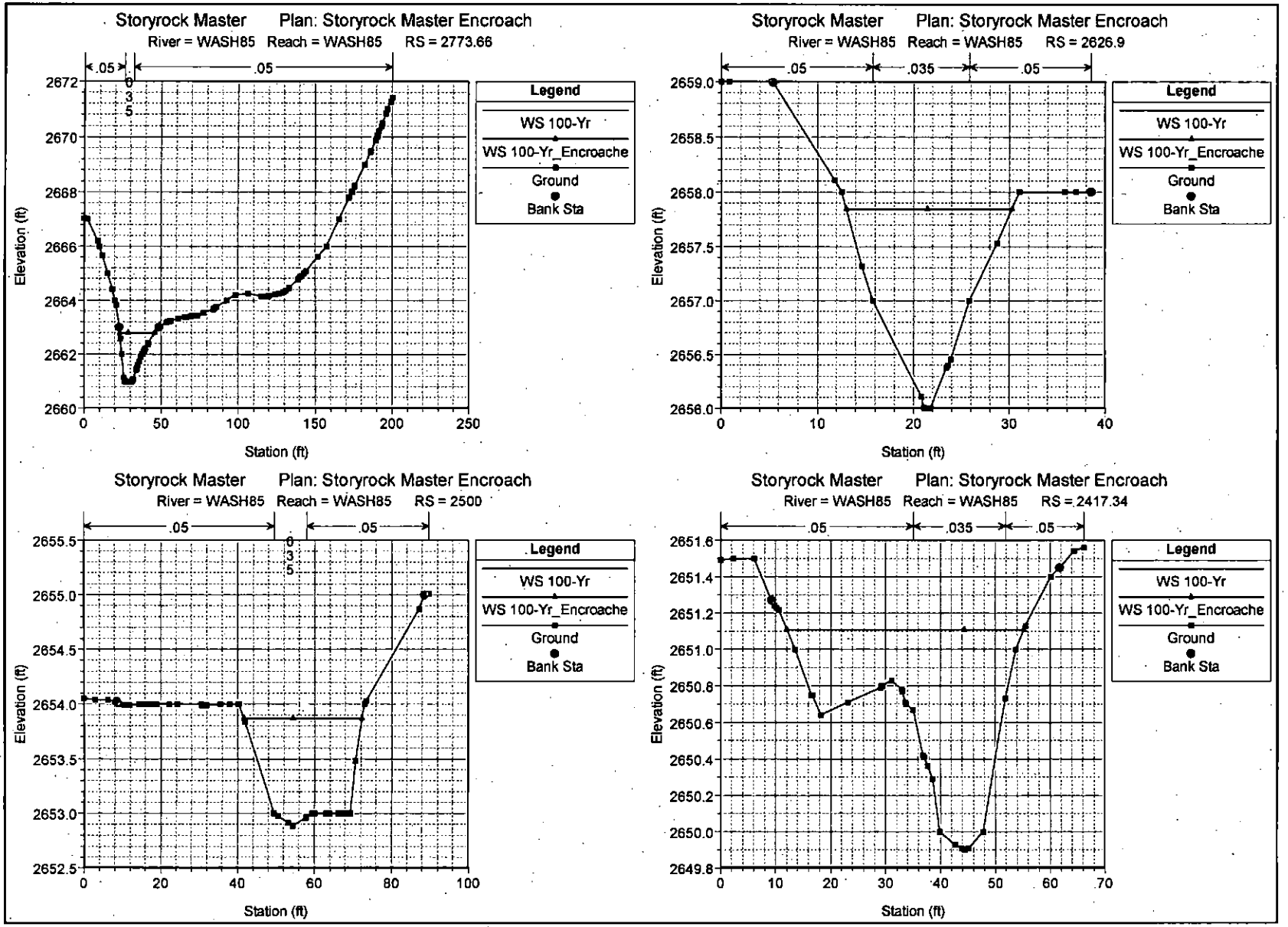
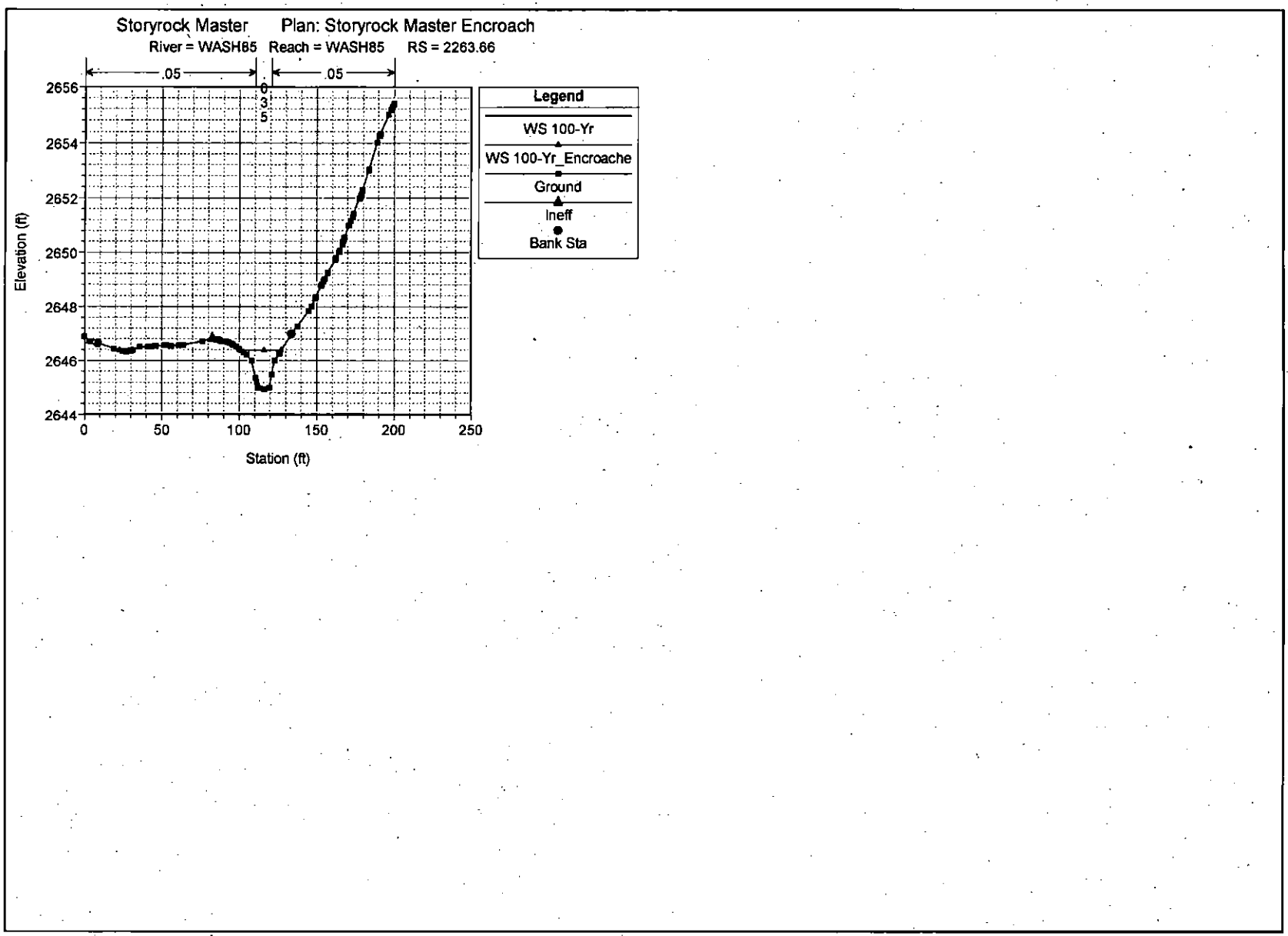
River = WASH85 Reach = WASH85 RS = 3238.46
.05 .035 .05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 3081.51
.05 .035 .05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 2967.67
.05 .035 .05 .035 .05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 2879.41
.05 .035 .05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta


Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 2773.66
.05
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 2626.9
.05
.035
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 2500
.05
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 2417.34
.05
.035
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)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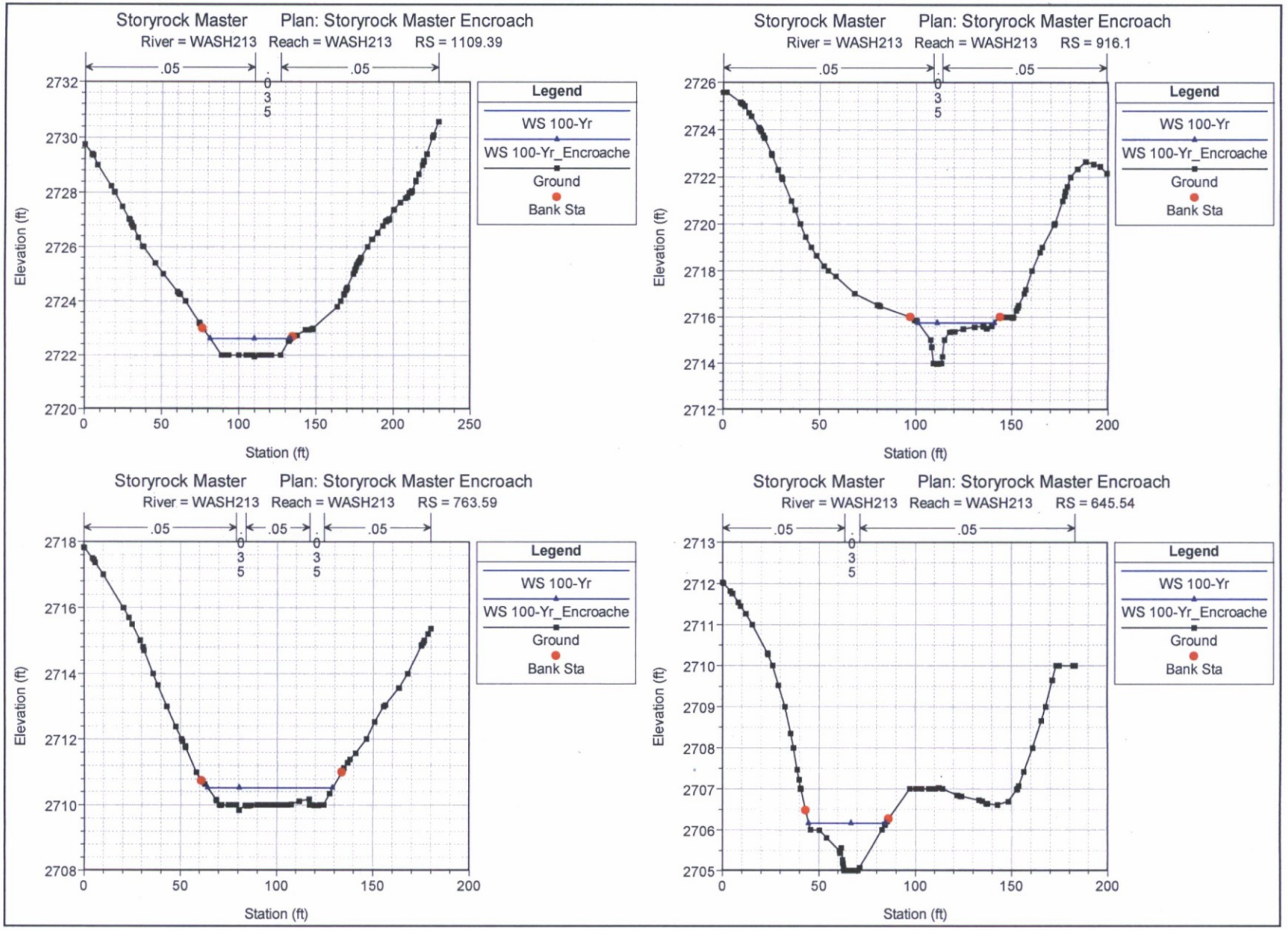
River = WASH85 Reach = WASH85 RS = 2263.66
.05
.05
0
3
5
2656
2654
2652
2650
2648
2646
2644
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta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River = WASH213 Reach = WASH213 RS = 1109.39
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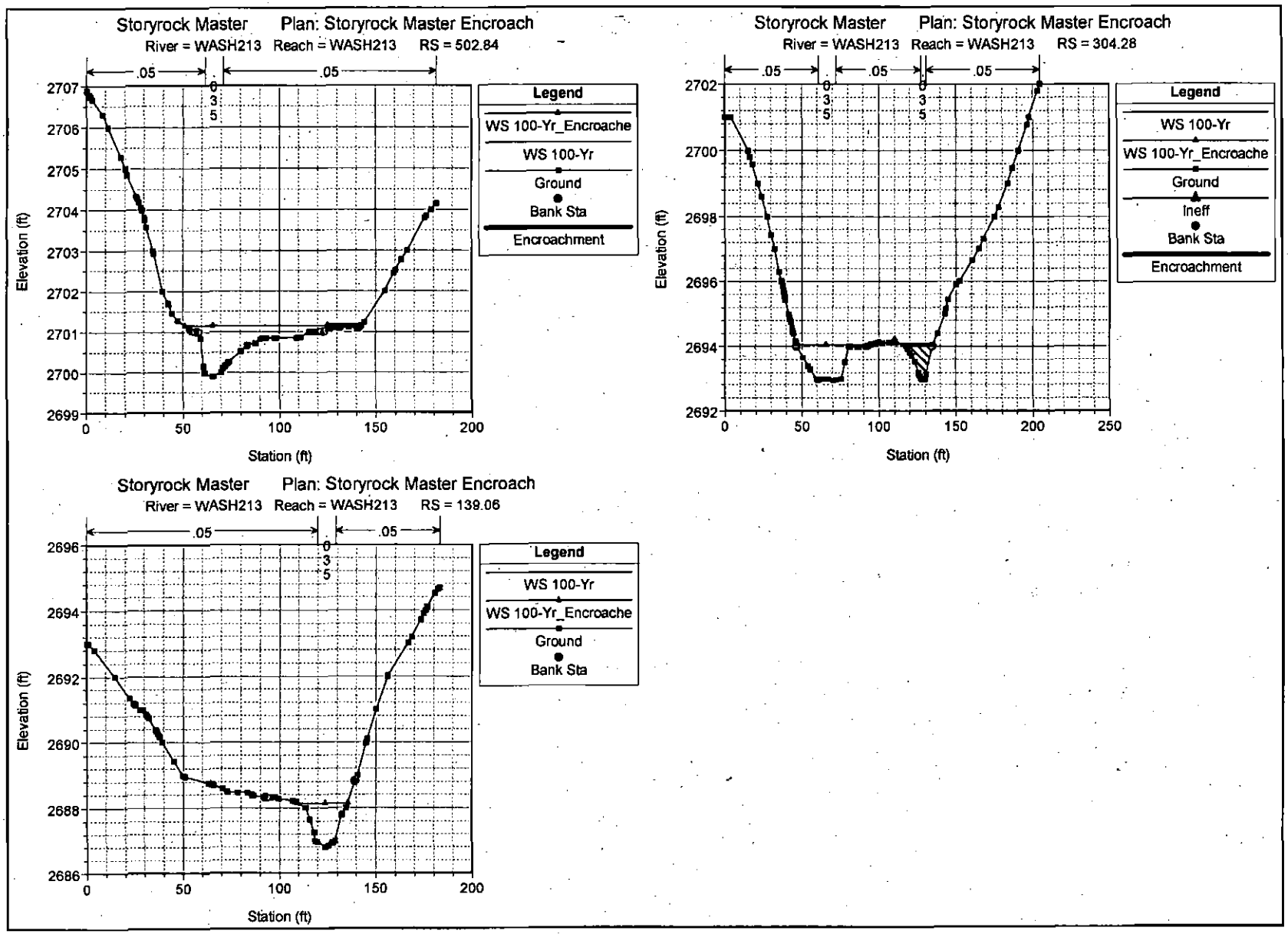
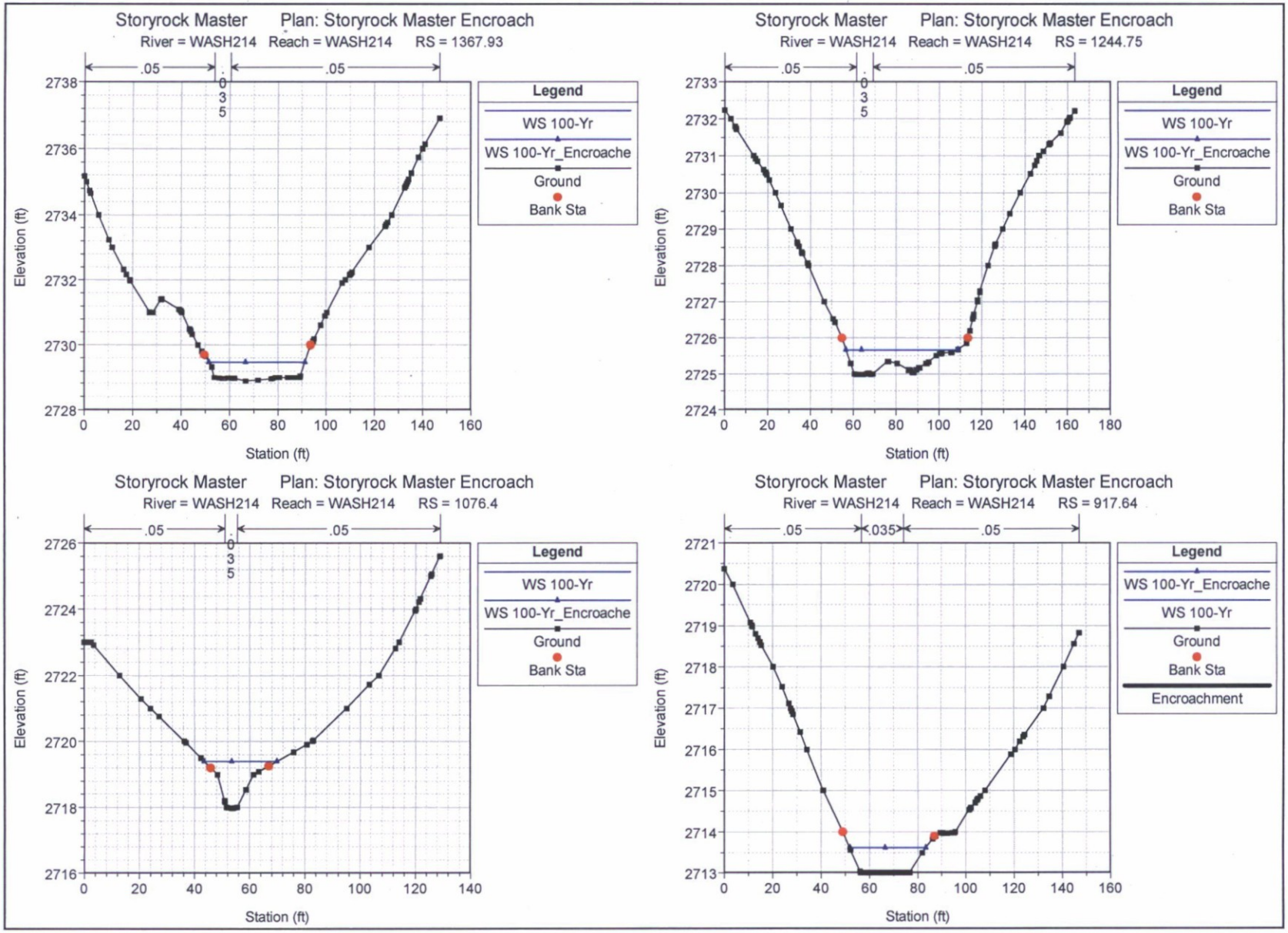
.05
.035
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH213 Reach = WASH213 RS = 916.1
.05
.05
.035
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH213 Reach = WASH213 RS = 763.59
.05
.05
.05
.035
.035
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH213 Reach = WASH213 RS = 645.54
.05
.05
.035
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Encroach
River = WASH213 Reach = WASH213 RS = 502.84
.05
.05
0
3
5
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH213 Reach = WASH213 RS = 304.28
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH213 Reach = WASH213 RS = 139.06
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta


Storyrock Master Plan: Storyrock Master Encroach
River = WASH214 Reach = WASH214 RS = 1367.93
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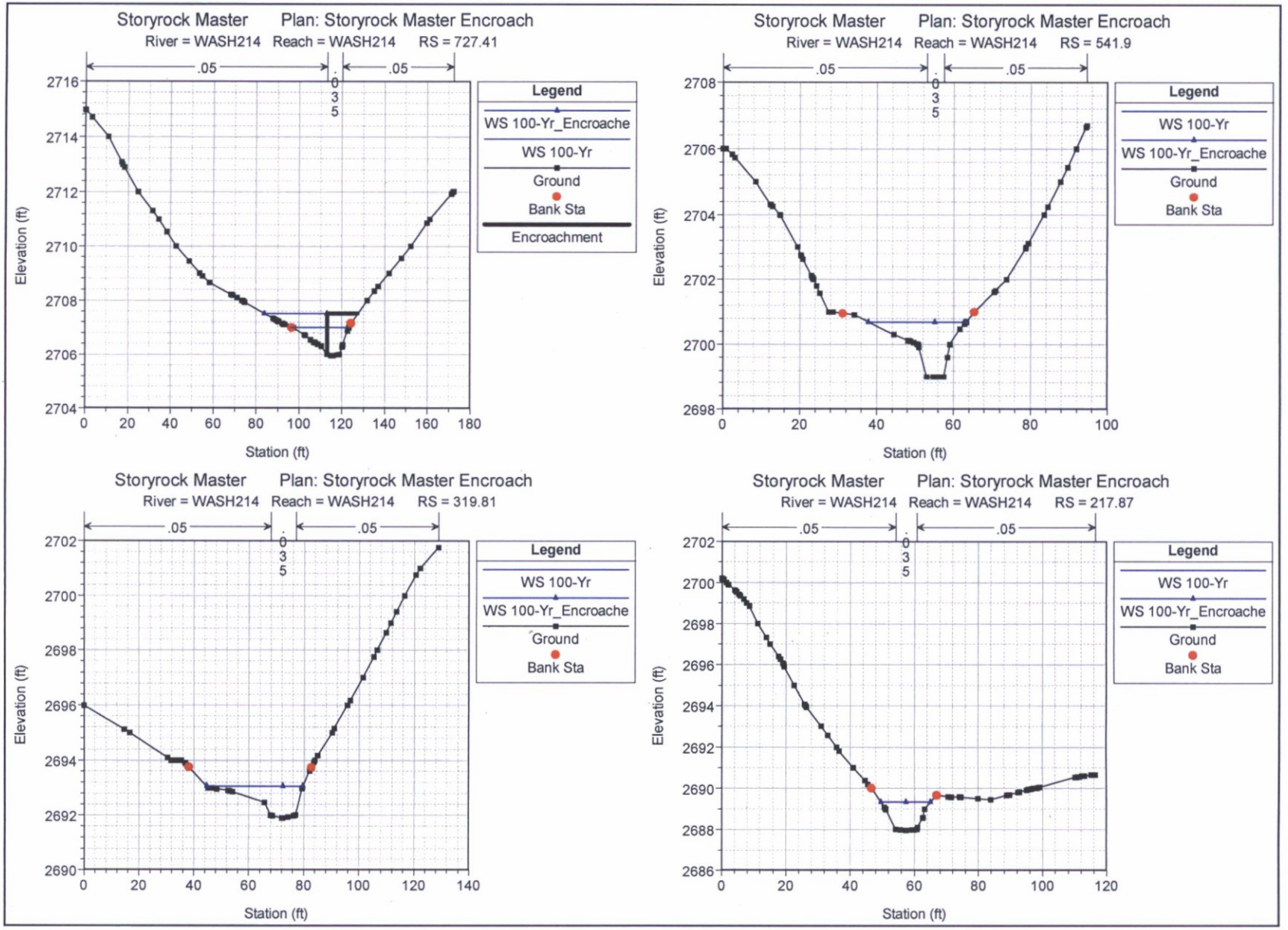
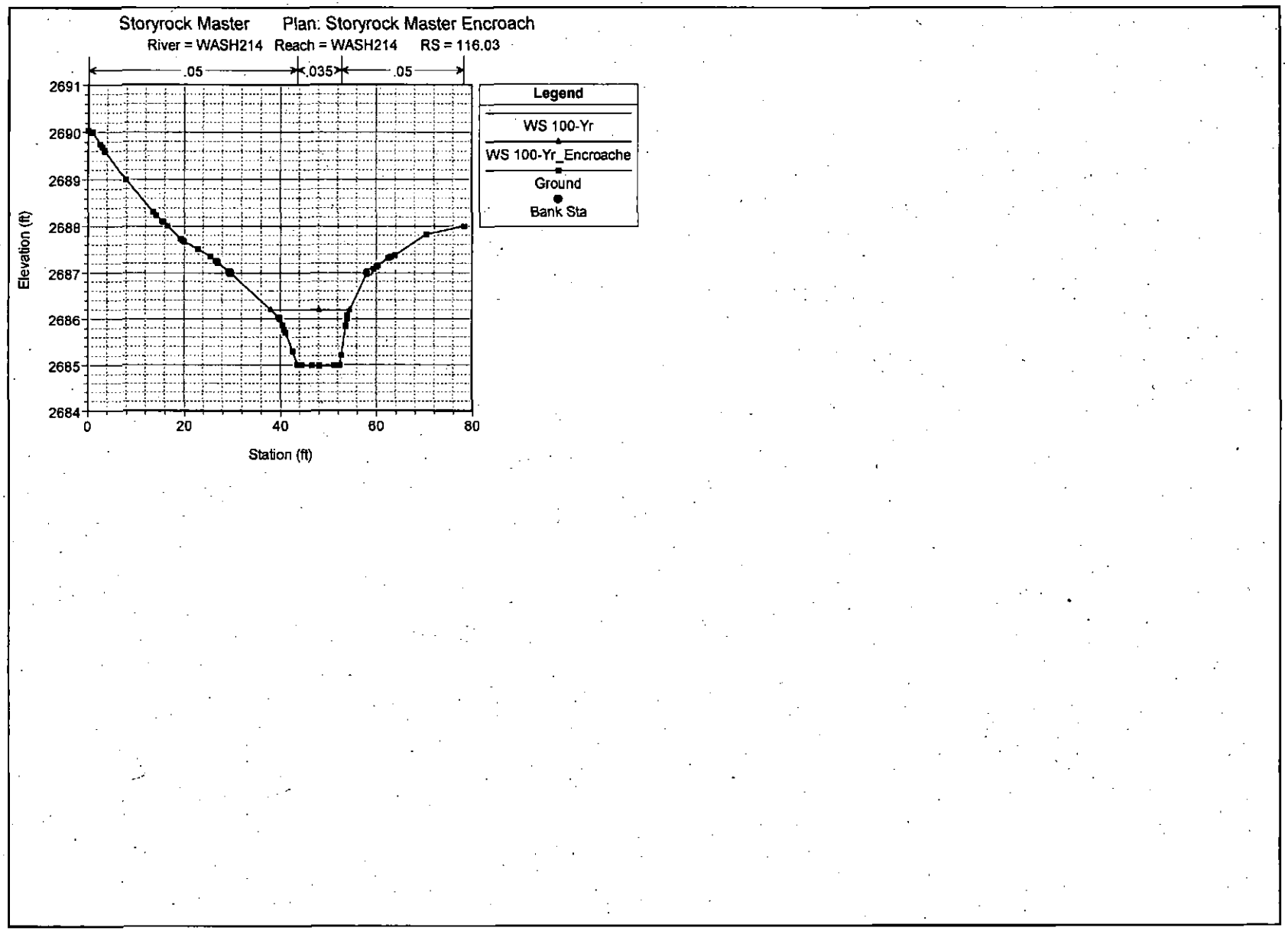
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH214 Reach = WASH214 RS = 1244.75
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH214 Reach = WASH214 RS = 1076.4
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH214 Reach = WASH214 RS = 917.64
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment


Storyrock Master Plan: Storyrock Master Encroach
River = WASH214 Reach = WASH214 RS = 727.41
.05
.05
0.035
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH214 Reach = WASH214 RS = 541.9
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH214 Reach = WASH214 RS = 319.81
Storyrock Master Plan: Storyrock Master Encroach
River = WASH214 Reach = WASH214 RS = 217.87


Storyrock Master Plan: Storyrock Master Encroach
River = WASH214 Reach = WASH214 RS = 116.03
.05
.035
.05
2691
2690
2689
2688
2687
2686
2685
2684
Elevation (ft)
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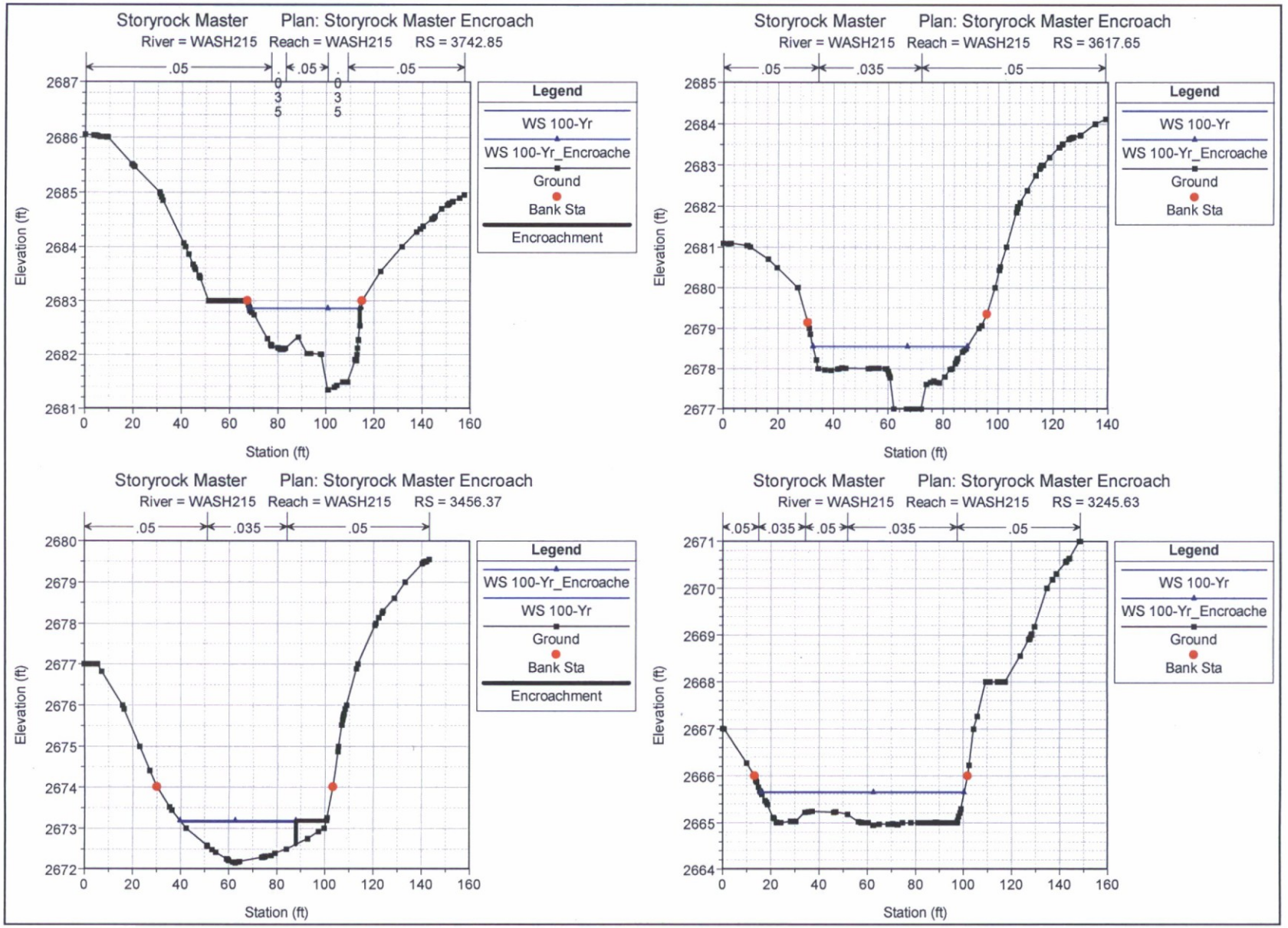
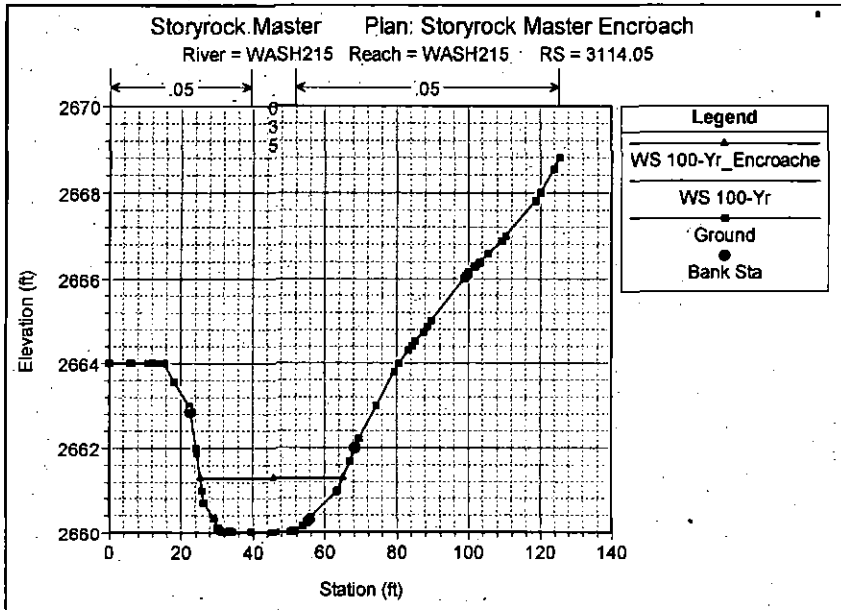
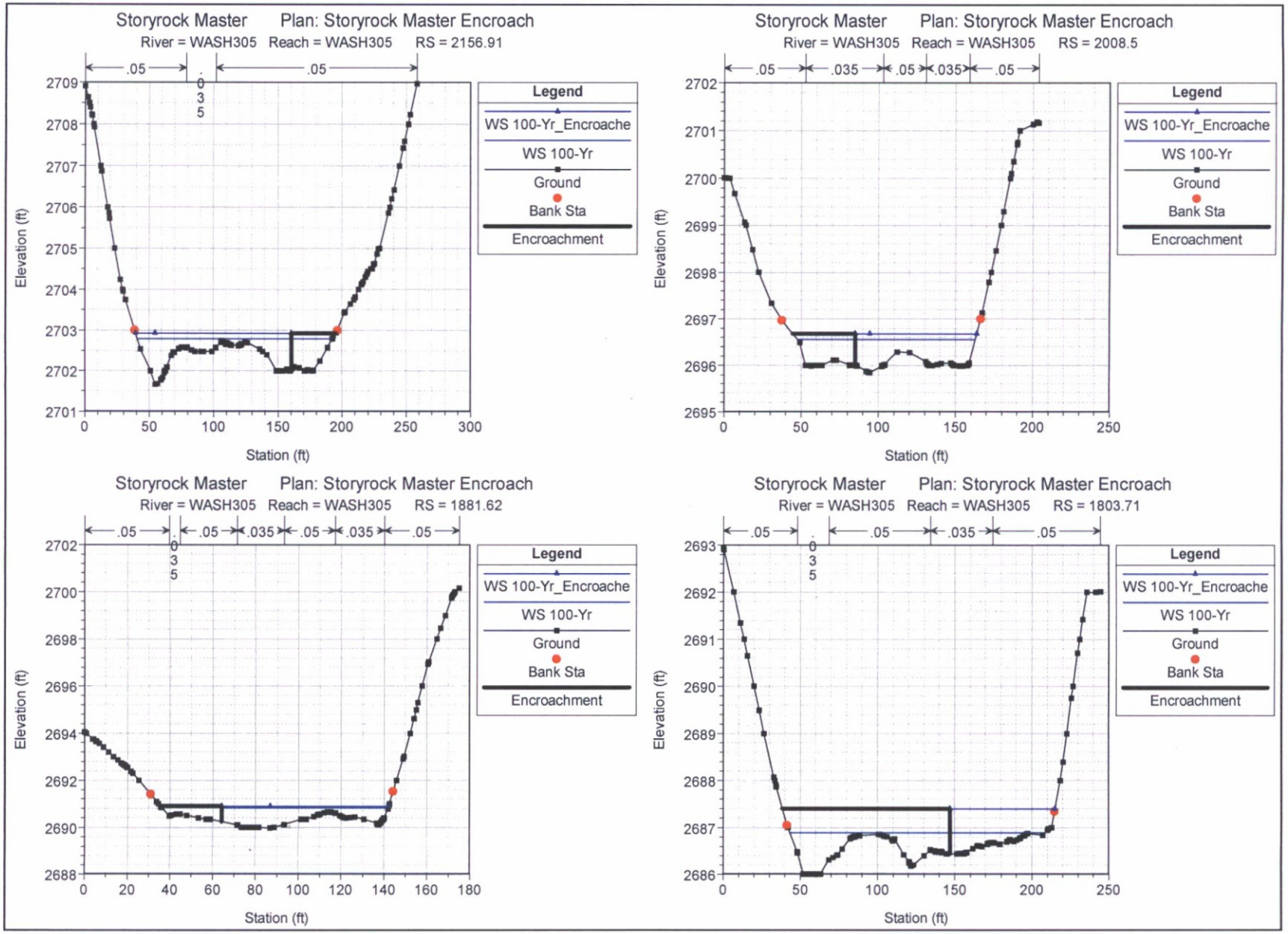
20
40
60
80
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta


Storyrock Master Plan: Storyrock Master Encroach
River = WASH215 Reach = WASH215 RS = 3742.85
.05
.05
.05
.05
.035
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH215 Reach = WASH215 RS = 3617.65
.05
.035
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH215 Reach = WASH215 RS = 3456.37
.05
.035
.05
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH215 Reach = WASH215 RS = 3245.63
.05
.035
.05
.035
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Encroach
River = WASH215 Reach = WASH215 RS = 3114.05
.05
.05
0
3
5
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
2670
2668
2666
2664
2662
2660
0
20
40
60
80
100
120
140
Station (ft)


Storyrock Master Plan: Storyrock Master Encroach
River = WASH305 Reach = WASH305 RS = 2156.91
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH305 Reach = WASH305 RS = 2008.5
.05
.035
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH305 Reach = WASH305 RS = 1881.62
.05
.035
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH305 Reach = WASH305 RS = 1803.71
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment

HEC-RAS Plan: Encroach Locations: User Defined

River	Reach	River Sta	Profile	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)	
WASH80	WASH80	3439.74	100-Yr	63.00	2668.00	2669.53	2669.66	2670.15	0.037908	6.29	10.01	12.04	1.22
WASH80	WASH80	3439.74	100-Yr_Encroache	63.00	2668.00	2669.53	2669.66	2670.15	0.037908	6.29	10.01	12.04	1.22
WASH80	WASH80	3319.74	100-Yr	63.00	2664.55	2665.64	2665.71	2666.10	0.029498	5.44	11.59	22.56	1.16
WASH80	WASH80	3319.74	100-Yr_Encroache	63.00	2664.55	2665.64	2665.71	2666.10	0.029498	5.44	11.59	22.56	1.16
WASH80	WASH80	3239.73	100-Yr	69.00	2660.98	2662.39	2662.61	2663.23	0.042624	7.35	9.39	10.37	1.36
WASH80	WASH80	3239.73	100-Yr_Encroache	69.00	2660.98	2662.39	2662.61	2663.23	0.042624	7.35	9.39	10.37	1.36
WASH80	WASH80	3048.09	100-Yr	69.00	2655.91	2657.38	2657.42	2657.88	0.019041	5.69	12.12	13.85	1.07
WASH80	WASH80	3048.09	100-Yr_Encroache	69.00	2655.91	2657.38	2657.42	2657.88	0.019041	5.69	12.12	13.85	1.07
WASH80	WASH80	2743.18	100-Yr	102.00	2647.99	2649.04	2649.20	2649.59	0.036051	5.96	17.11	31.50	1.43
WASH80	WASH80	2743.18	100-Yr_Encroache	102.00	2647.99	2649.04	2649.20	2649.59	0.036051	5.96	17.11	31.50	1.43
WASH80	WASH80	2491.17	100-Yr	102.00	2640.97	2641.75	2641.78	2642.05	0.024801	4.38	23.30	45.56	1.08
WASH80	WASH80	2491.17	100-Yr_Encroache	102.00	2640.97	2641.75	2641.78	2642.05	0.024801	4.38	23.30	45.56	1.08
WASH80	WASH80	2092.43	100-Yr	124.00	2628.00	2628.93	2628.99	2629.19	0.041120	4.09	30.29	81.44	1.18
WASH80	WASH80	2092.43	100-Yr_Encroache	124.00	2628.00	2628.93	2628.99	2629.19	0.041120	4.09	30.29	81.44	1.18
WASH85	WASH85	3805.86	100-Yr	89.00	2694.99	2695.58	2695.68	2695.99	0.035652	5.14	17.31	36.14	1.31
WASH85	WASH85	3805.86	100-Yr_Encroache	89.00	2694.99	2695.58	2695.68	2695.99	0.035652	5.14	17.31	36.14	1.31
WASH85	WASH85	3694.75	100-Yr	107.00	2689.88	2691.26	2691.54	2692.14	0.033152	7.51	14.25	20.46	1.59
WASH85	WASH85	3694.75	100-Yr_Encroache	107.00	2689.88	2691.26	2691.54	2692.14	0.033152	7.51	14.25	20.46	1.59
WASH85	WASH85	3561.36	100-Yr	107.00	2685.13	2686.73	2686.84	2687.36	0.037644	6.37	16.80	18.72	1.19
WASH85	WASH85	3561.36	100-Yr_Encroache	107.00	2685.13	2686.73	2686.84	2687.36	0.037644	6.37	16.80	18.72	1.19
WASH85	WASH85	3382.35	100-Yr	130.00	2680.00	2681.48	2681.64	2682.16	0.023941	6.62	19.63	22.86	1.26
WASH85	WASH85	3382.35	100-Yr_Encroache	130.00	2680.00	2681.48	2681.64	2682.16	0.023941	6.62	19.63	22.86	1.26
WASH85	WASH85	3238.46	100-Yr	130.00	2676.00	2677.61	2677.66	2678.02	0.033652	5.15	25.26	34.66	1.06
WASH85	WASH85	3238.46	100-Yr_Encroache	130.00	2676.00	2677.61	2677.66	2678.02	0.033652	5.15	25.26	34.66	1.06
WASH85	WASH85	3081.51	100-Yr	130.00	2671.56	2672.74	2672.78	2673.19	0.028258	5.34	24.35	31.54	1.07
WASH85	WASH85	3081.51	100-Yr_Encroache	130.00	2671.56	2672.74	2672.78	2673.19	0.028258	5.34	24.35	31.54	1.07
WASH85	WASH85	2967.67	100-Yr	130.00	2666.99	2668.91	2668.91	2669.12	0.012310	3.72	34.91	55.51	0.83
WASH85	WASH85	2967.67	100-Yr_Encroache	130.00	2666.99	2668.91	2668.91	2669.12	0.012310	3.72	34.91	55.51	0.83
WASH85	WASH85	2879.41	100-Yr	130.00	2664.22	2665.38	2665.80	2666.78	0.077635	9.49	13.69	17.59	1.90
WASH85	WASH85	2879.41	100-Yr_Encroache	130.00	2664.22	2665.38	2665.80	2666.78	0.077635	9.49	13.69	17.59	1.90
WASH85	WASH85	2773.66	100-Yr	130.00	2660.98	2662.78	2662.78	2663.28	0.032922	5.70	22.81	22.79	1.00
WASH85	WASH85	2773.66	100-Yr_Encroache	130.00	2660.98	2662.78	2662.78	2663.28	0.032922	5.70	22.81	22.79	1.00
WASH85	WASH85	2626.9	100-Yr	130.00	2656.00	2657.85	2658.17	2658.76	0.028494	7.65	16.98	17.26	1.36
WASH85	WASH85	2626.9	100-Yr_Encroache	130.00	2656.00	2657.85	2658.17	2658.76	0.028494	7.65	16.98	17.26	1.36
WASH85	WASH85	2500	100-Yr	130.00	2652.89	2653.87	2654.09	2654.40	0.039686	5.81	22.36	30.70	1.20
WASH85	WASH85	2500	100-Yr_Encroache	130.00	2652.89	2653.87	2654.09	2654.40	0.039686	5.81	22.36	30.70	1.20
WASH85	WASH85	2417.34	100-Yr	130.00	2649.90	2651.11	2651.22	2651.56	0.029500	5.39	24.13	43.26	1.27
WASH85	WASH85	2417.34	100-Yr_Encroache	130.00	2649.90	2651.11	2651.22	2651.56	0.029500	5.39	24.13	43.26	1.27
WASH85	WASH85	2263.66	100-Yr	130.00	2644.94	2646.39	2646.62	2647.13	0.027938	6.92	18.77	34.36	1.44
WASH85	WASH85	2263.66	100-Yr_Encroache	130.00	2644.94	2646.39	2646.62	2647.13	0.027938	6.92	18.77	34.36	1.44
WASH213	WASH213	1109.39	100-Yr	122.00	2721.94	2722.60	2722.64	2722.92	0.037523	4.49	27.19	52.03	1.09
WASH213	WASH213	1109.39	100-Yr_Encroache	122.00	2721.94	2722.60	2722.64	2722.92	0.037523	4.49	27.19	52.03	1.09
WASH213	WASH213	916.1	100-Yr	122.00	2713.97	2715.76	2715.92	2716.29	0.031276	5.88	20.74	39.68	1.43
WASH213	WASH213	916.1	100-Yr_Encroache	122.00	2713.97	2715.76	2715.92	2716.29	0.031276	5.88	20.74	39.68	1.43
WASH213	WASH213	763.59	100-Yr	122.00	2709.84	2710.52	2710.53	2710.77	0.040990	4.05	30.12	64.86	1.05
WASH213	WASH213	763.59	100-Yr_Encroache	122.00	2709.84	2710.52	2710.53	2710.77	0.040990	4.05	30.12	64.86	1.05
WASH213	WASH213	645.54	100-Yr	122.00	2705.00	2706.16	2706.23	2706.57	0.031048	5.10	23.92	39.99	1.16
WASH213	WASH213	645.54	100-Yr_Encroache	122.00	2705.00	2706.16	2706.23	2706.57	0.031048	5.10	23.92	39.99	1.16
WASH213	WASH213	502.84	100-Yr	122.00	2699.90	2701.14	2701.12	2701.34	0.032003	3.55	35.65	91.24	0.87
WASH213	WASH213	502.84	100-Yr_Encroache	122.00	2699.90	2701.15	2701.12	2701.34	0.032009	3.56	34.85	73.61	0.87
WASH213	WASH213	304.28	100-Yr	122.00	2692.95	2694.06	2694.06	2694.35	0.038841	4.37	27.93	68.17	1.01
WASH213	WASH213	304.28	100-Yr_Encroache	122.00	2692.95	2694.06	2694.06	2694.35	0.038841	4.37	27.93	48.12	1.01
WASH213	WASH213	139.06	100-Yr	122.00	2686.81	2688.15	2688.38	2688.78	0.029300	6.35	19.23	25.92	1.30
WASH213	WASH213	139.06	100-Yr_Encroache	122.00	2686.81	2688.15	2688.37	2688.78	0.029300	6.35	19.23	25.92	1.30
WASH214	WASH214	1367.93	100-Yr	58.00	2728.88	2729.47	2729.39	2729.61	0.024251	3.08	18.86	39.49	0.78
WASH214	WASH214	1367.93	100-Yr_Encroache	58.00	2728.88	2729.47	2729.39	2729.61	0.024251	3.08	18.86	39.49	0.78
WASH214	WASH214	1244.75	100-Yr	79.00	2724.98	2725.68	2725.68	2725.89	0.035970	3.68	21.45	52.47	1.02
WASH214	WASH214	1244.75	100-Yr_Encroache	79.00	2724.98	2725.68	2725.68	2725.89	0.035970	3.68	21.45	52.47	1.02

HEC-RAS Plan: Encroach Locations: User Defined (Continued)

River	Reach	River Sta	Profile	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)	
WASH214	WASH214	1076.4	100-Yr	79.00	2717.97	2719.39	2719.41	2719.78	0.036440	4.97	16.25	26.22	1.01
WASH214	WASH214	1076.4	100-Yr_Encroache	79.00	2717.97	2719.39	2719.41	2719.78	0.036440	4.97	16.25	26.22	1.01
WASH214	WASH214	917.64	100-Yr	79.00	2713.00	2713.62	2713.70	2714.00	0.036441	4.93	16.02	31.51	1.22
WASH214	WASH214	917.64	100-Yr_Encroache	79.00	2713.00	2713.62	2713.70	2714.00	0.036353	4.93	16.03	31.44	1.22
WASH214	WASH214	727.41	100-Yr	79.00	2705.95	2707.02	2707.10	2707.43	0.032709	5.16	15.32	26.92	1.20
WASH214	WASH214	727.41	100-Yr_Encroache	79.00	2706.02	2707.51	2707.53	2707.83	0.032100	4.75	18.44	28.97	0.87
WASH214	WASH214	541.9	100-Yr	79.00	2698.99	2700.70	2700.63	2700.99	0.030924	4.33	18.26	25.49	0.90
WASH214	WASH214	541.9	100-Yr_Encroache	79.00	2698.99	2700.70	2700.62	2700.99	0.030924	4.33	18.26	25.49	0.90
WASH214	WASH214	319.81	100-Yr	79.00	2691.90	2693.06	2693.05	2693.33	0.038597	4.17	18.96	34.95	1.00
WASH214	WASH214	319.81	100-Yr_Encroache	79.00	2691.90	2693.06	2693.05	2693.33	0.038597	4.17	18.96	34.95	1.00
WASH214	WASH214	217.87	100-Yr	79.00	2687.97	2689.34	2689.34	2689.81	0.030814	5.49	14.38	15.55	1.01
WASH214	WASH214	217.87	100-Yr_Encroache	79.00	2687.97	2689.34	2689.34	2689.81	0.030814	5.49	14.38	15.55	1.01
WASH214	WASH214	116.03	100-Yr	79.00	2684.98	2686.19	2686.23	2686.67	0.030721	5.52	14.31	16.43	1.04
WASH214	WASH214	116.03	100-Yr_Encroache	79.00	2684.98	2686.19	2686.22	2686.67	0.030721	5.52	14.31	16.43	1.04
WASH215	WASH215	3742.85	100-Yr	229.00	2681.34	2682.86	2682.94	2683.42	0.044596	6.00	38.19	46.44	1.17
WASH215	WASH215	3742.85	100-Yr_Encroache	229.00	2681.34	2682.86	2682.94	2683.42	0.044561	6.03	38.00	45.64	1.16
WASH215	WASH215	3617.65	100-Yr	229.00	2677.00	2678.56	2678.57	2678.98	0.028345	5.23	43.82	56.21	1.04
WASH215	WASH215	3617.65	100-Yr_Encroache	229.00	2677.00	2678.56	2678.57	2678.98	0.028398	5.23	43.79	56.21	1.04
WASH215	WASH215	3456.37	100-Yr	229.00	2672.15	2673.15	2673.30	2673.74	0.037444	6.14	37.29	60.07	1.37
WASH215	WASH215	3456.37	100-Yr_Encroache	229.00	2672.15	2673.19	2673.36	2673.86	0.035402	6.55	34.94	48.18	1.36
WASH215	WASH215	3245.63	100-Yr	235.00	2664.95	2665.66	2665.71	2666.03	0.035157	4.89	48.01	84.85	1.15
WASH215	WASH215	3245.63	100-Yr_Encroache	235.00	2664.95	2665.64	2665.71	2666.04	0.038151	5.02	46.79	84.59	1.19
WASH215	WASH215	3114.05	100-Yr	245.00	2660.01	2661.28	2661.33	2661.86	0.028594	6.12	40.01	39.55	1.07
WASH215	WASH215	3114.05	100-Yr_Encroache	245.00	2660.01	2661.30	2661.33	2661.86	0.026823	5.99	40.88	39.70	1.04
WASH305	WASH305	2156.91	100-Yr	270.00	2701.65	2702.79	2702.81	2703.04	0.046564	3.96	68.15	151.78	1.04
WASH305	WASH305	2156.91	100-Yr_Encroache	270.00	2701.65	2702.93	2702.93	2703.19	0.037186	4.09	66.02	121.41	0.98
WASH305	WASH305	2008.5	100-Yr	282.00	2695.85	2696.55	2696.65	2696.96	0.040498	5.12	55.13	115.11	1.30
WASH305	WASH305	2008.5	100-Yr_Encroache	282.00	2695.85	2696.69	2696.81	2697.23	0.042939	5.90	47.76	78.86	1.34
WASH305	WASH305	1881.62	100-Yr	282.00	2689.97	2690.85	2690.92	2691.24	0.050443	5.04	55.91	105.80	1.22
WASH305	WASH305	1881.62	100-Yr_Encroache	282.00	2689.97	2690.90	2691.00	2691.41	0.049019	5.74	49.10	78.12	1.28
WASH305	WASH305	1803.71	100-Yr	282.00	2686.00	2686.90	2687.00	2687.29	0.051058	5.00	56.44	165.55	1.51
WASH305	WASH305	1803.71	100-Yr_Encroache	282.00	2686.44	2687.41	2687.51	2687.95	0.040494	5.91	47.74	68.06	1.24
WASH305	WASH305	1661.16	100-Yr	294.00	2678.98	2680.21	2680.35	2680.75	0.041488	5.89	49.93	102.06	1.48
WASH305	WASH305	1661.16	100-Yr_Encroache	294.00	2678.98	2680.13	2680.35	2680.89	0.060725	7.01	41.95	100.19	1.91

O SITE BOUNDARY CROSS SECTION

HY-8 Culvert Calculation Output

HY-8 Culvert Analysis Report

Culvert: ON-140

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 53 cfs

Design Flow: 132 cfs

Maximum Flow: 132 cfs

Table 1 - Summary of Culvert Flows at Crossing: ON140

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2667.59	53.00	53.00	0.00	1
2667.74	60.90	60.90	0.00	1
2667.88	68.80	68.80	0.00	1
2668.01	76.70	76.70	0.00	1
2668.14	84.60	84.60	0.00	1
2668.26	92.50	92.50	0.00	1
2668.38	100.40	100.40	0.00	1
2668.49	108.30	108.30	0.00	1
2668.61	116.20	116.20	0.00	1
2668.72	124.10	124.10	0.00	1
2668.84	132.00	132.00	0.00	1
2670.00	201.88	201.88	0.00	Overtopping

Rating Curve Plot for Crossing: ON140

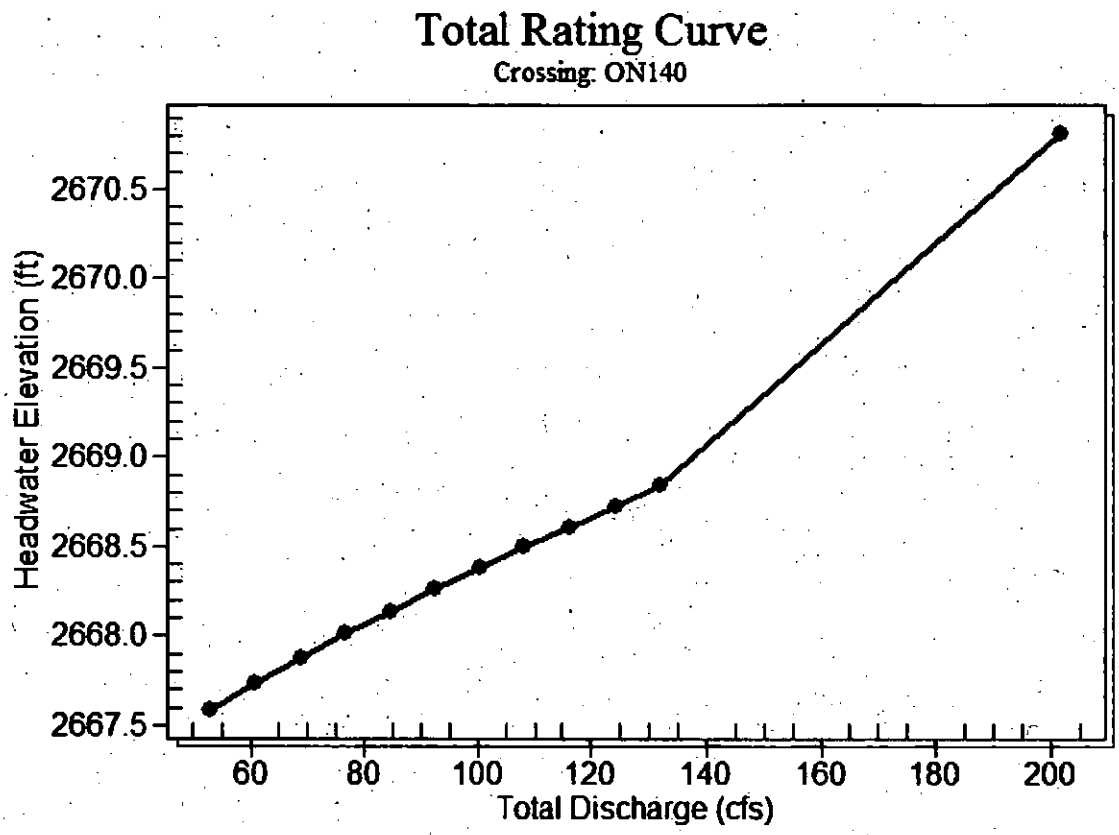


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
53.00	53.00	2667.59	1.591	1.095	1-JS1t	0.677	1.155	2.000	2.000	2.650	0.000
60.90	60.90	2667.74	1.739	1.126	1-S2n	0.729	1.241	0.830	2.000	9.565	0.000
68.80	68.80	2667.88	1.879	1.160	1-S2n	0.781	1.325	0.889	2.000	9.770	0.000
76.70	76.70	2668.01	2.012	1.199	1-S2n	0.829	1.404	0.947	2.000	9.986	0.000
84.60	84.60	2668.14	2.138	1.243	1-S2n	0.869	1.478	1.003	2.000	10.177	0.000
92.50	92.50	2668.26	2.260	1.290	1-S2n	0.908	1.547	1.055	2.000	10.402	0.000
100.40	100.40	2668.38	2.378	1.342	1-S2n	0.947	1.613	1.107	2.000	10.598	0.000
108.30	108.30	2668.49	2.494	1.398	1-S2n	0.986	1.679	1.159	2.000	10.725	0.000
116.20	116.20	2668.61	2.609	1.458	1-S2n	1.026	1.741	1.208	2.000	10.885	0.000
124.10	124.10	2668.72	2.723	1.522	1-S2n	1.065	1.803	1.255	2.000	11.060	0.000
132.00	132.00	2668.84	2.839	1.591	1-S2n	1.102	1.862	1.303	2.000	11.194	0.000

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Straight Culvert

Inlet Elevation (invert): 2666.00 ft, Outlet Elevation (invert): 2665.00 ft

Culvert Length: 40.01 ft, Culvert Slope: 0.0250

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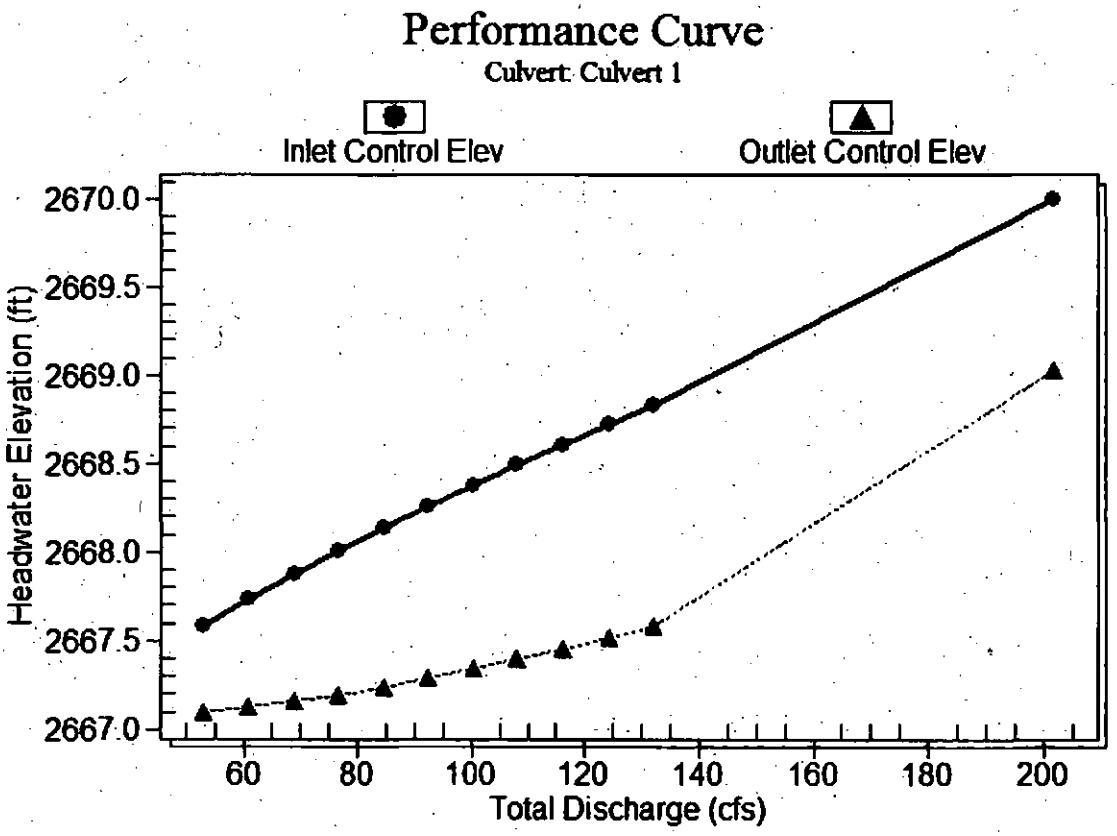
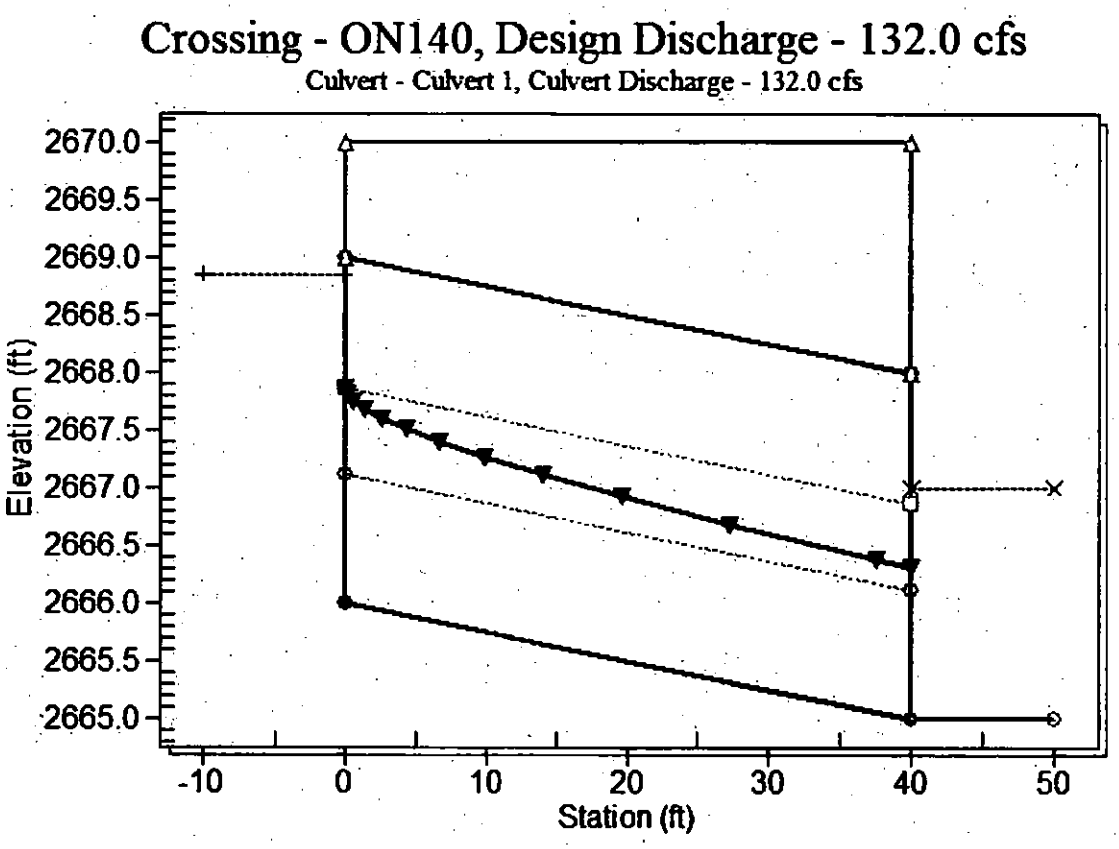
Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2666.00 ft

Outlet Station: 40.00 ft

Outlet Elevation: 2665.00 ft

Number of Barrels: 4

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: ON140)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
53.00	2667.00	2.00
60.90	2667.00	2.00
68.80	2667.00	2.00
76.70	2667.00	2.00
84.60	2667.00	2.00
92.50	2667.00	2.00
100.40	2667.00	2.00
108.30	2667.00	2.00
116.20	2667.00	2.00
124.10	2667.00	2.00
132.00	2667.00	2.00

Tailwater Channel Data - ON140

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2667.00 ft

Roadway Data for Crossing: ON140

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 90.00 ft

Crest Elevation: 2670.00 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Culvert: ON-215B

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 33 cfs

Design Flow: 91 cfs

Maximum Flow: 233 cfs

Table 4 - Summary of Culvert Flows at Crossing: ON215B

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2682.19	33.00	33.00	0.00	1
2682.55	53.00	53.00	0.00	1
2682.89	73.00	73.00	0.00	1
2683.16	91.00	91.00	0.00	1
2683.45	113.00	113.00	0.00	1
2683.72	133.00	133.00	0.00	1
2683.99	153.00	153.00	0.00	1
2684.28	173.00	173.00	0.00	1
2684.61	193.00	193.00	0.00	1
2684.97	213.00	213.00	0.00	1
2685.15	233.00	222.54	10.34	7
2685.00	214.76	214.76	0.00	Overtopping

Rating Curve Plot for Crossing: ON215B

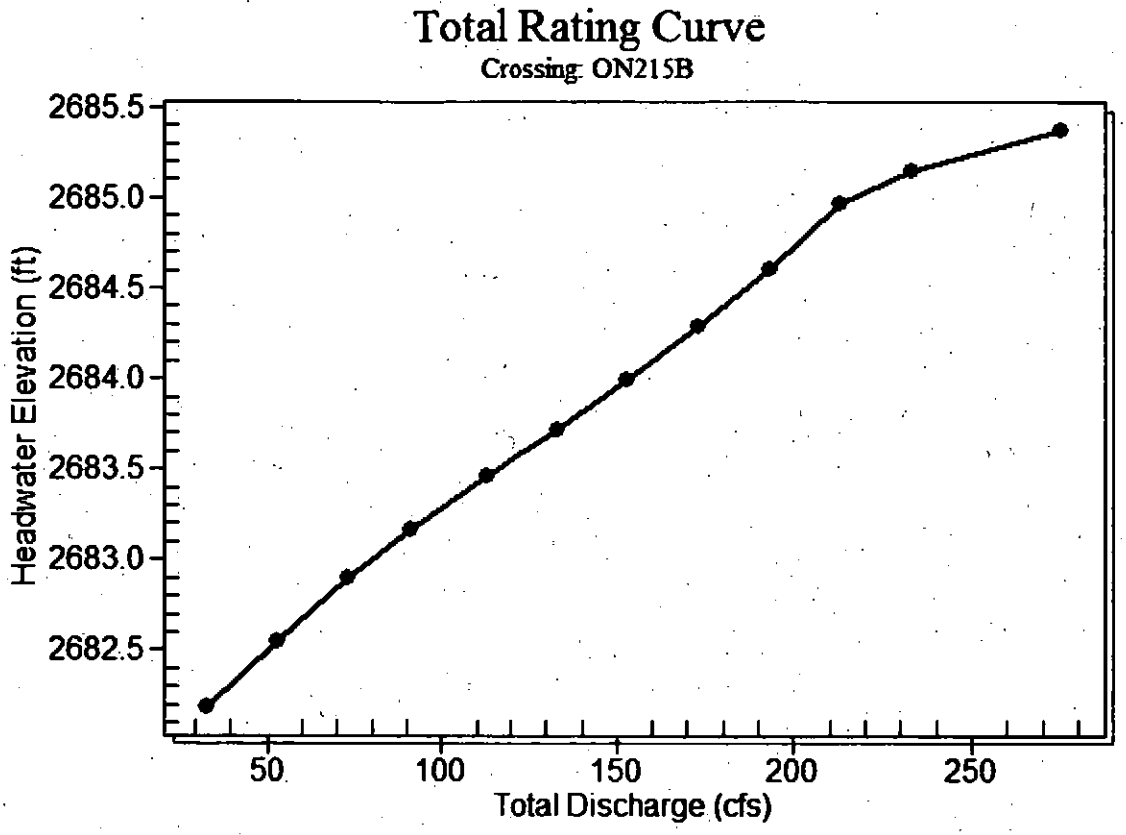


Table 5 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
33.00	33.00	2682.19	1.191	0.0*	1-S2n	0.470	0.901	0.514	1.500	10.145	0.000
53.00	53.00	2682.55	1.546	0.0*	1-S2n	0.604	1.155	0.672	1.500	11.085	0.000
73.00	73.00	2682.89	1.892	0.0*	1-S2n	0.708	1.368	0.806	1.500	11.910	0.000
91.00	91.00	2683.16	2.158	0.0*	1-S2n	0.802	1.534	0.917	1.500	12.383	0.000
113.00	113.00	2683.45	2.454	0.090	1-S2n	0.892	1.716	1.042	1.500	12.920	0.000
133.00	133.00	2683.72	2.717	0.387	1-S2n	0.971	1.869	1.149	1.500	13.332	0.000
153.00	153.00	2683.99	2.990	0.693	1-S2n	1.049	2.007	1.250	1.500	13.704	0.000
173.00	173.00	2684.28	3.284	1.016	5-S2n	1.122	2.140	1.347	1.500	14.051	0.000
193.00	193.00	2684.61	3.608	1.720	5-S2n	1.189	2.259	1.442	1.500	14.355	0.000
213.00	213.00	2684.97	3.967	2.012	5-S2n	1.255	2.368	1.532	1.500	14.663	0.000
233.00	222.54	2685.15	4.150	2.158	5-S2n	1.287	2.417	1.574	1.500	14.811	0.000

* Full Flow Headwater elevation is below inlet invert.

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Straight Culvert

Inlet Elevation (invert): 2681.00 ft, Outlet Elevation (invert): 2679.00 ft

Culvert Length: 50.04 ft, Culvert Slope: 0.0400

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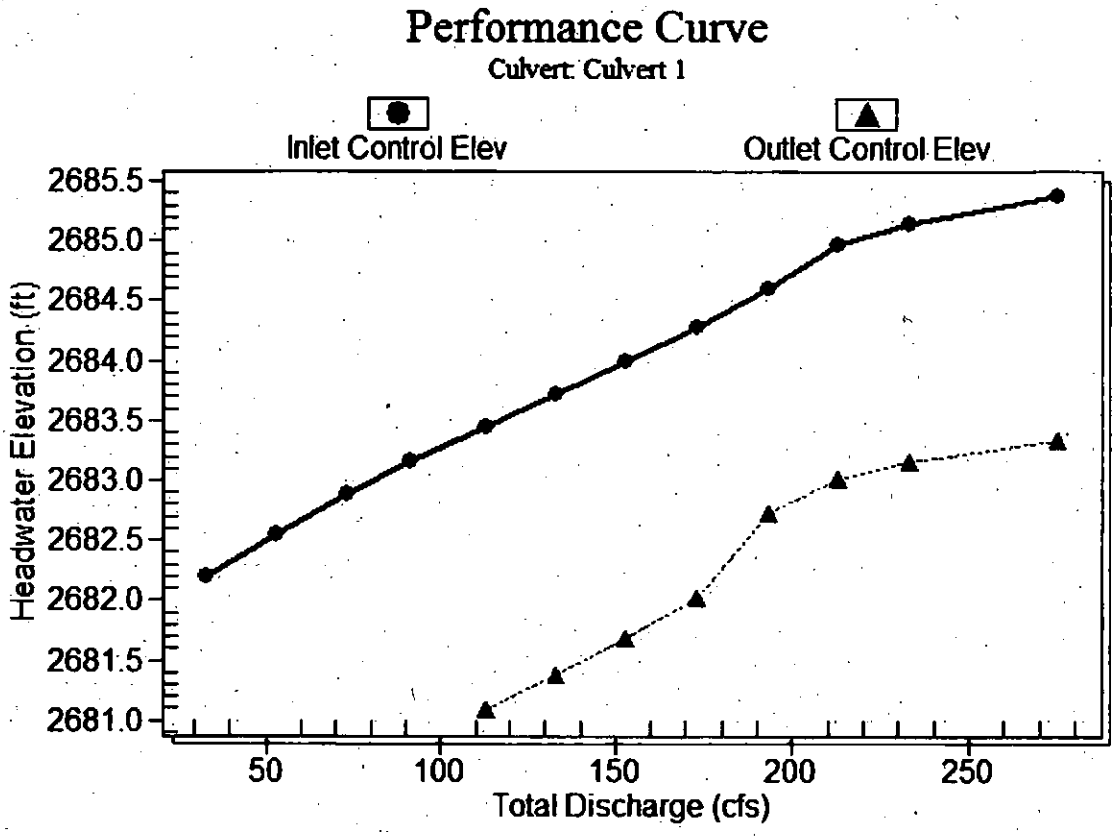
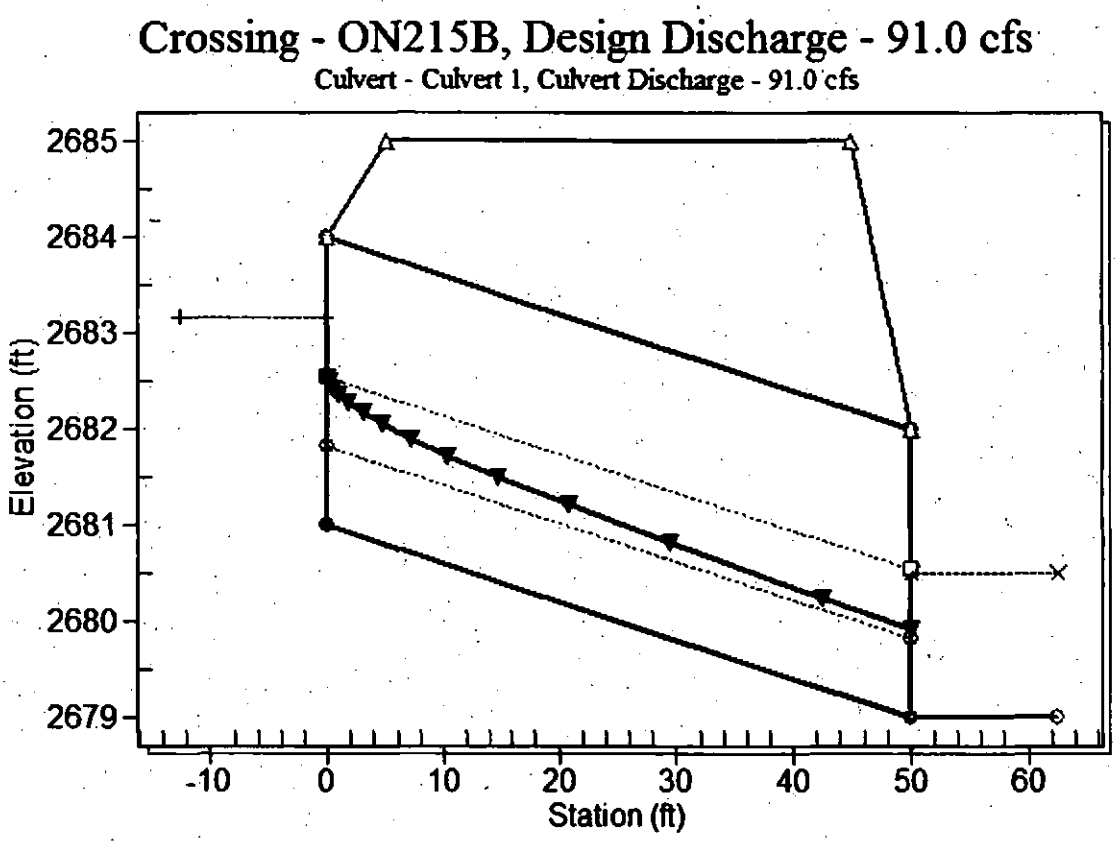
Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2681.00 ft

Outlet Station: 50.00 ft

Outlet Elevation: 2679.00 ft

Number of Barrels: 4

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: NONE

Table 6 - Downstream Channel Rating Curve (Crossing: ON215B)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
33.00	2680.50	1.50
53.00	2680.50	1.50
73.00	2680.50	1.50
91.00	2680.50	1.50
113.00	2680.50	1.50
133.00	2680.50	1.50
153.00	2680.50	1.50
173.00	2680.50	1.50
193.00	2680.50	1.50
213.00	2680.50	1.50
233.00	2680.50	1.50

Tailwater Channel Data - ON215B

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2680.50 ft

Roadway Data for Crossing: ON215B

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

Crest Elevation: 2685.00 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Culvert: ON-125

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 25 cfs

Maximum Flow: 49 cfs

Table 7 - Summary of Culvert Flows at Crossing: ON125

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2655.00	0.00	0.00	0.00	1
2656.27	4.90	4.90	0.00	1
2657.20	9.80	9.80	0.00	1
2658.73	14.70	14.70	0.00	1
2660.97	19.60	19.60	0.00	1
2661.09	24.50	19.83	4.56	7
2661.09	25.00	19.84	5.04	3
2661.19	34.30	20.01	14.14	4
2661.23	39.20	20.08	19.09	4
2661.26	44.10	20.15	23.86	3
2661.30	49.00	20.21	28.74	3
2661.00	19.66	19.66	0.00	Overtopping

Rating Curve Plot for Crossing: ON125

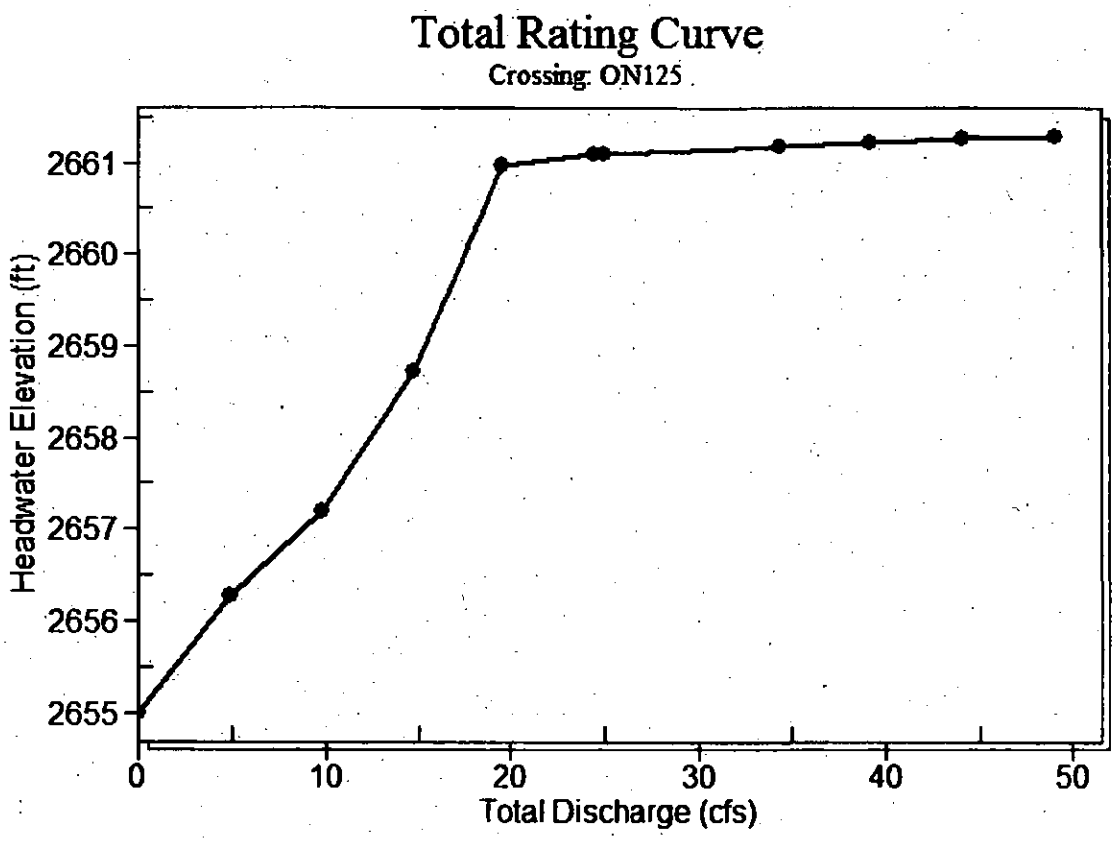


Table 8 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2655.00	0.000	0.000	0-NF	0.000	0.000	0.000	3.000	0.000	0.000
4.90	4.90	2656.27	1.266	0.100	1-S2n	0.533	0.847	0.562	3.000	8.110	0.000
9.80	9.80	2657.20	2.203	1.365	5-S2n	0.788	1.206	0.854	3.000	9.430	0.000
14.70	14.70	2658.73	3.729	2.724	5-S2n	1.031	1.396	1.112	3.000	10.452	0.000
19.60	19.60	2660.97	5.965	4.546	6-FFc	1.500	1.500	1.500	3.000	11.617	0.000
24.50	19.83	2661.09	6.088	4.641	6-FFc	1.500	1.500	1.500	3.000	11.752	0.000
25.00	19.84	2661.09	6.094	4.645	6-FFc	1.500	1.500	1.500	3.000	11.759	0.000
34.30	20.01	2661.19	6.185	4.716	6-FFc	1.500	1.500	1.500	3.000	11.859	0.000
39.20	20.08	2661.23	6.225	4.747	6-FFc	1.500	1.500	1.500	3.000	11.903	0.000
44.10	20.15	2661.26	6.261	4.775	6-FFc	1.500	1.500	1.500	3.000	11.942	0.000
49.00	20.21	2661.30	6.295	4.801	6-FFc	1.500	1.500	1.500	3.000	11.978	0.000

Straight Culvert

Inlet Elevation (invert): 2655.00 ft, Outlet Elevation (invert): 2654.00 ft

Culvert Length: 40.01 ft, Culvert Slope: 0.0250

Table 9 - Downstream Channel Rating Curve (Crossing: ON125)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	2654.00	3.00
4.90	2654.00	3.00
9.80	2654.00	3.00
14.70	2654.00	3.00
19.60	2654.00	3.00
24.50	2654.00	3.00
25.00	2654.00	3.00
34.30	2654.00	3.00
39.20	2654.00	3.00
44.10	2654.00	3.00
49.00	2654.00	3.00

Tailwater Channel Data - ON125

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2654.00 ft

Roadway Data for Crossing: ON125

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

Crest Elevation: 2661.00 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Culvert: ON-126

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 25 cfs

Maximum Flow: 49 cfs

Table 10 - Summary of Culvert Flows at Crossing: ON126

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2651.00	0.00	0.00	0.00	1
2651.73	4.90	4.90	0.00	1
2652.07	9.80	9.80	0.00	1
2652.38	14.70	14.70	0.00	1
2652.65	19.60	19.60	0.00	1
2652.92	24.50	24.50	0.00	1
2652.94	25.00	25.00	0.00	1
2653.50	34.30	34.30	0.00	1
2653.85	39.20	39.20	0.00	1
2654.25	44.10	44.10	0.00	1
2654.71	49.00	49.00	0.00	1
2655.00	51.87	51.87	0.00	Overtopping

Rating Curve Plot for Crossing: ON126

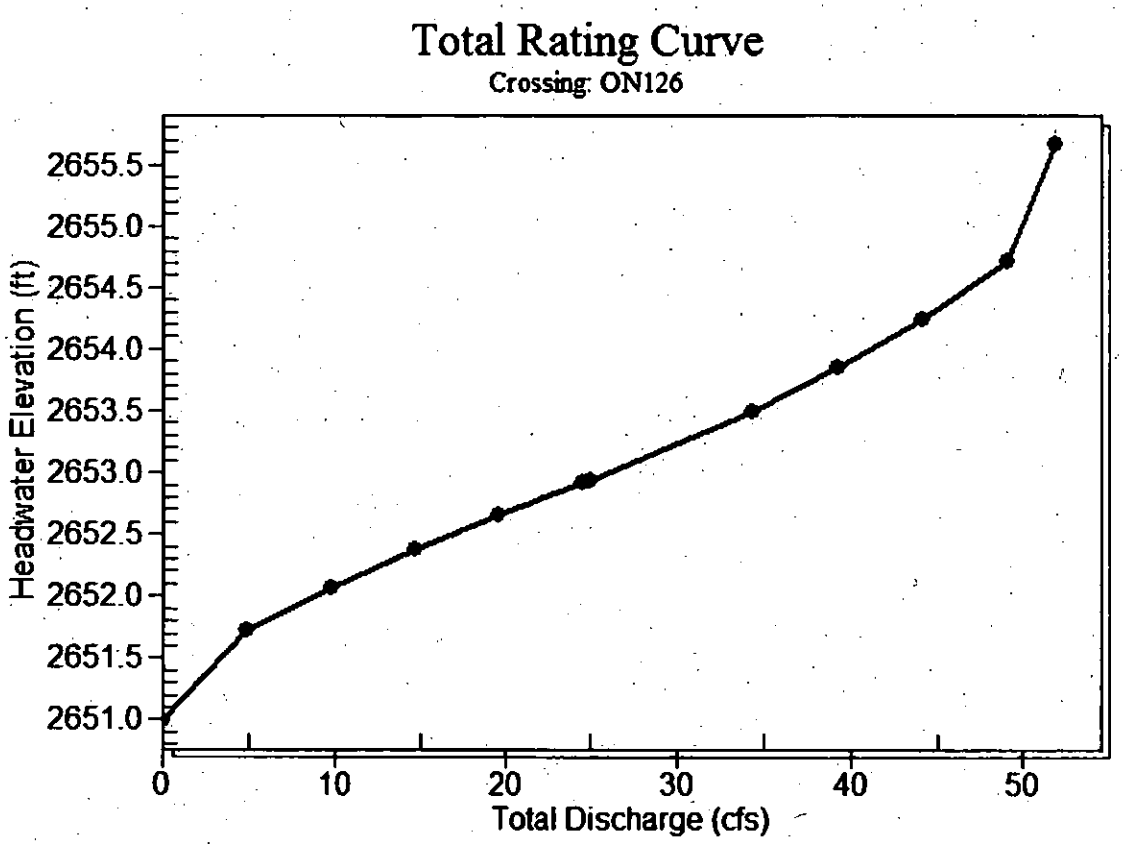


Table 11 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2651.00	0.000	0.000	0-NF	0.000	0.000	1.000	1.000	0.000	0.000
4.90	4.90	2651.73	0.729	0.0*	1-S2n	0.316	0.540	0.332	1.000	7.063	0.000
9.80	9.80	2652.07	1.068	0.0*	1-S2n	0.450	0.774	0.474	1.000	8.521	0.000
14.70	14.70	2652.38	1.383	0.0*	1-S2n	0.561	0.963	0.594	1.000	9.489	0.000
19.60	19.60	2652.65	1.655	0.0*	1-S2n	0.648	1.115	0.706	1.000	9.880	0.000
24.50	24.50	2652.92	1.917	0.234	1-S2n	0.734	1.256	0.801	1.000	10.414	0.000
25.00	25.00	2652.94	1.944	0.267	1-S2n	0.742	1.269	0.811	1.000	10.444	0.000
34.30	34.30	2653.50	2.501	0.929	5-S2n	0.882	1.491	0.981	1.000	11.194	0.000
39.20	39.20	2653.85	2.852	1.519	5-S2n	0.953	1.589	1.065	1.000	11.523	0.000
44.10	44.10	2654.25	3.253	1.888	5-S2n	1.021	1.676	1.146	1.000	11.853	0.000
49.00	49.00	2654.71	3.708	2.288	5-S2n	1.089	1.748	1.225	1.000	12.160	0.000

* Full Flow Headwater elevation is below inlet invert.

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Straight Culvert

Inlet Elevation (invert): 2651.00 ft, Outlet Elevation (invert): 2649.50 ft

Culvert Length: 50.02 ft, Culvert Slope: 0.0300

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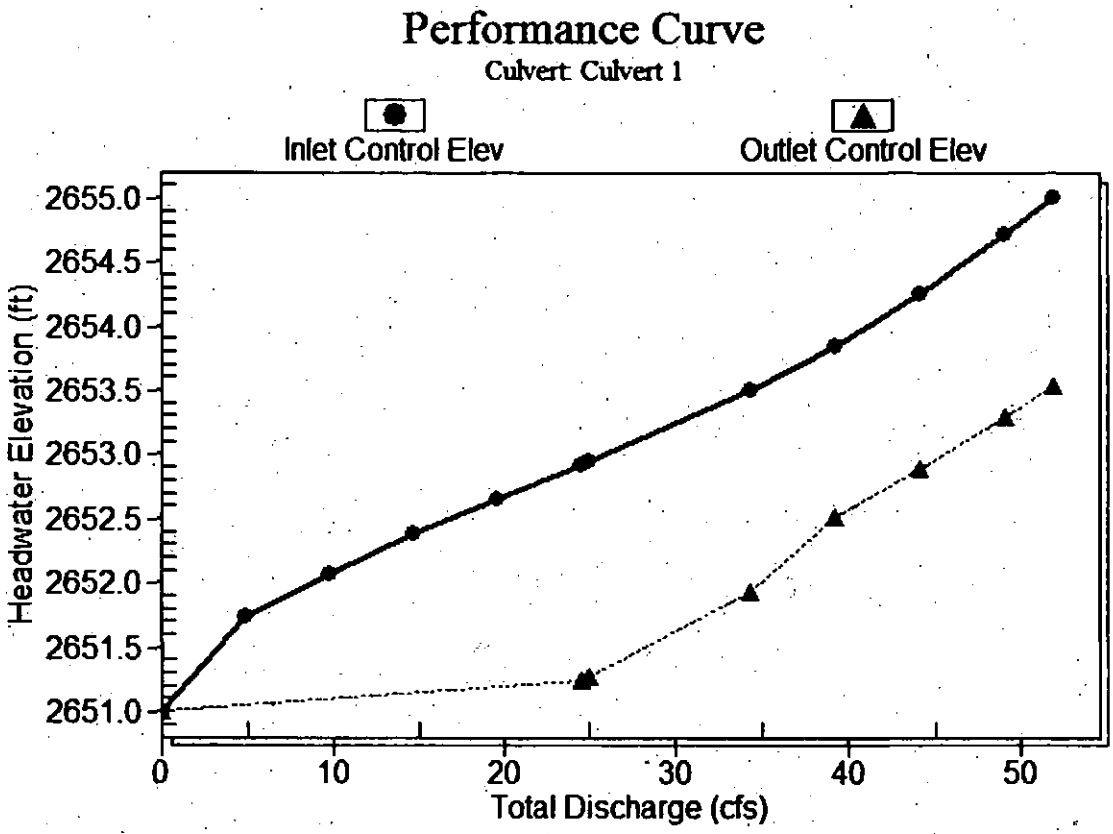
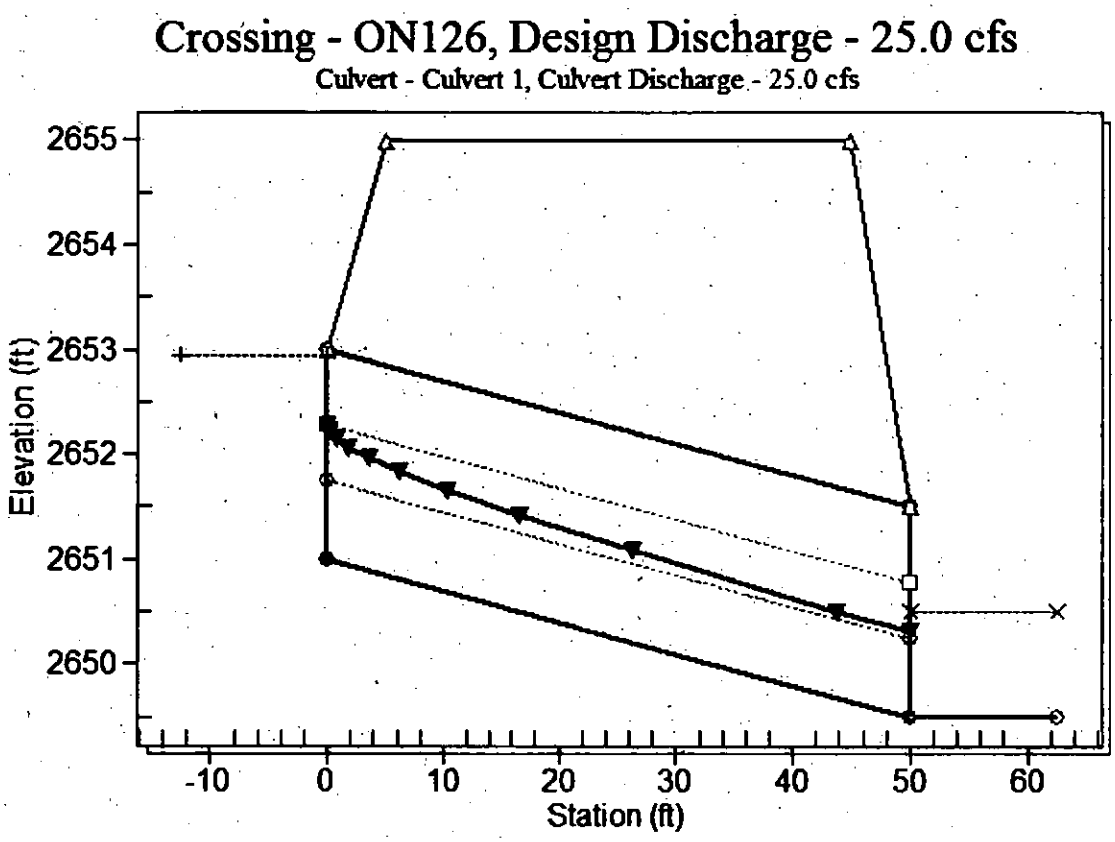
Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2651.00 ft

Outlet Station: 50.00 ft

Outlet Elevation: 2649.50 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Table 12 - Downstream Channel Rating Curve (Crossing: ON126)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	2650.50	1.00
4.90	2650.50	1.00
9.80	2650.50	1.00
14.70	2650.50	1.00
19.60	2650.50	1.00
24.50	2650.50	1.00
25.00	2650.50	1.00
34.30	2650.50	1.00
39.20	2650.50	1.00
44.10	2650.50	1.00
49.00	2650.50	1.00

Tailwater Channel Data - ON126

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2650.50 ft

Roadway Data for Crossing: ON126

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

Crest Elevation: 2655.00 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Culvert: ON-130

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 8 cfs

Maximum Flow: 20 cfs

Table 13 - Summary of Culvert Flows at Crossing: ON130

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2632.00	0.00	0.00	0.00	1
2632.65	2.00	2.00	0.00	1
2632.93	4.00	4.00	0.00	1
2633.20	6.00	6.00	0.00	1
2633.44	8.00	8.00	0.00	1
2633.66	10.00	10.00	0.00	1
2633.88	12.00	12.00	0.00	1
2634.10	14.00	14.00	0.00	1
2634.34	16.00	16.00	0.00	1
2634.60	18.00	18.00	0.00	1
2634.90	20.00	20.00	0.00	1
2635.00	20.63	20.63	0.00	Overtopping

Rating Curve Plot for Crossing: ON130

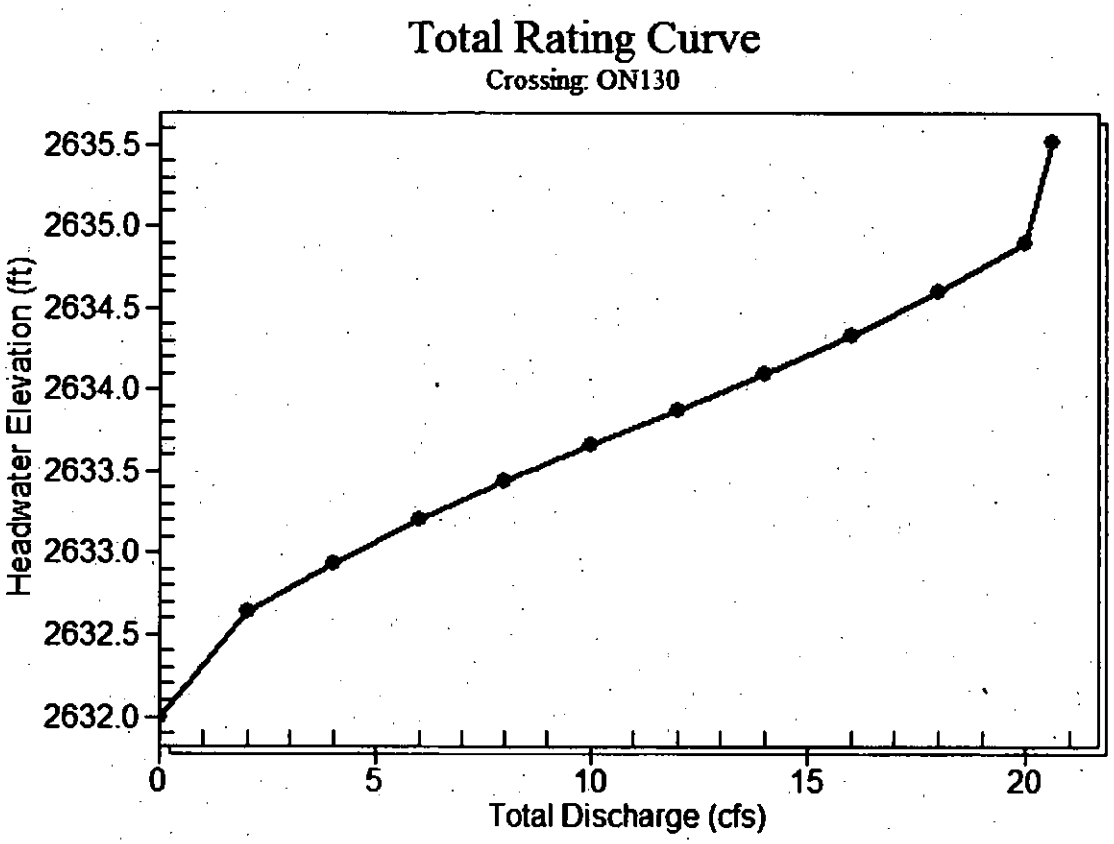


Table 14 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2632.00	0.000	0.000	0-NF	0.000	0.000	1.000	1.000	0.000	0.000
2.00	2.00	2632.65	0.645	0.0*	1-S2n	0.252	0.485	0.252	1.000	8.384	0.000
4.00	4.00	2632.93	0.934	0.0*	1-S2n	0.373	0.697	0.373	1.000	9.916	0.000
6.00	6.00	2633.20	1.202	0.0*	1-S2n	0.451	0.865	0.451	1.000	11.202	0.000
8.00	8.00	2633.44	1.443	0.0*	1-S2n	0.528	1.006	0.528	1.000	12.031	0.000
10.00	10.00	2633.66	1.662	0.0*	1-S2n	0.591	1.126	0.619	1.000	12.024	0.000
12.00	12.00	2633.88	1.875	0.0*	1-S2n	0.649	1.239	0.677	1.000	12.784	0.000
14.00	14.00	2634.10	2.097	0.0*	5-S2n	0.707	1.344	0.735	1.000	13.375	0.000
16.00	16.00	2634.34	2.337	0.0*	5-S2n	0.760	1.437	0.760	1.000	14.640	0.000
18.00	18.00	2634.60	2.602	0.0*	5-S2n	0.809	1.526	0.827	1.000	14.663	0.000
20.00	20.00	2634.90	2.899	0.0*	5-S2n	0.859	1.604	0.893	1.000	14.737	0.000

* Full Flow Headwater elevation is below inlet invert.

****

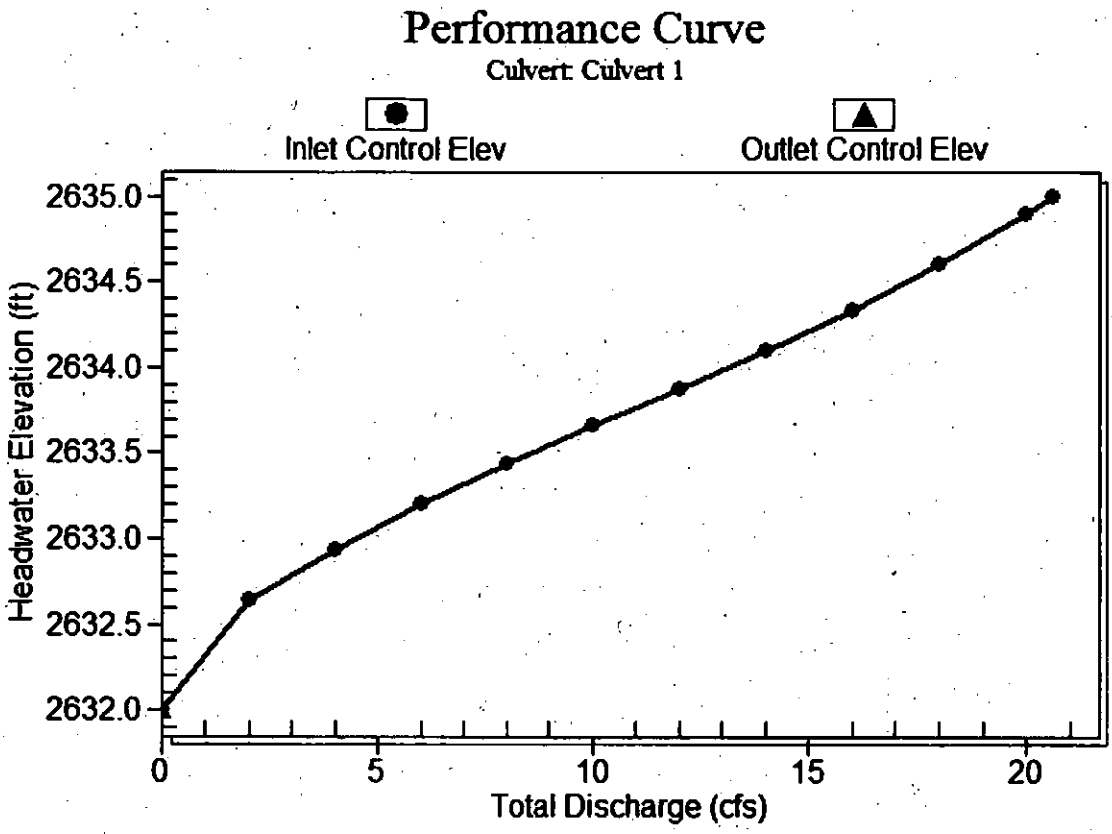
Straight Culvert

Inlet Etevation (invert): 2632.00 ft, Outlet Elevation (invert): 2626.00 ft

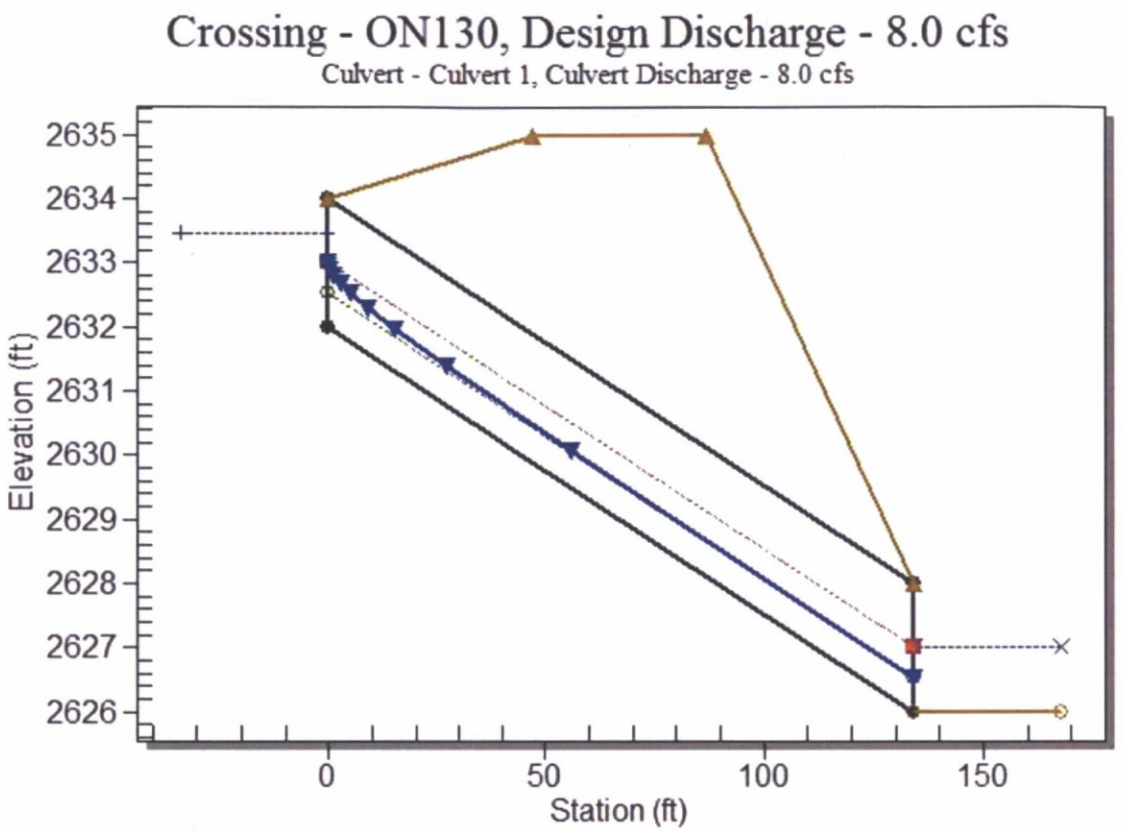
Culvert Length: 134.13 ft, Culvert Slope: 0.0448

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2632.00 ft

Outlet Station: 134.00 ft

Outlet Elevation: 2626.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Culvert: ON-115

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 28 cfs

Maximum Flow: 69 cfs

Table 16 - Summary of Culvert Flows at Crossing: ON115

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2654.00	0.00	0.00	0.00	1
2654.87	6.90	6.90	0.00	1
2655.31	13.80	13.80	0.00	1
2655.66	20.70	20.70	0.00	1
2656.00	27.60	27.60	0.00	1
2656.02	28.00	28.00	0.00	1
2656.86	41.40	41.40	0.00	1
2657.41	48.30	48.30	0.00	1
2658.05	55.20	55.20	0.00	1
2658.76	62.10	62.10	0.00	1
2659.53	69.00	69.00	0.00	1
2660.00	73.03	73.03	0.00	Overtopping

Rating Curve Plot for Crossing: ON115

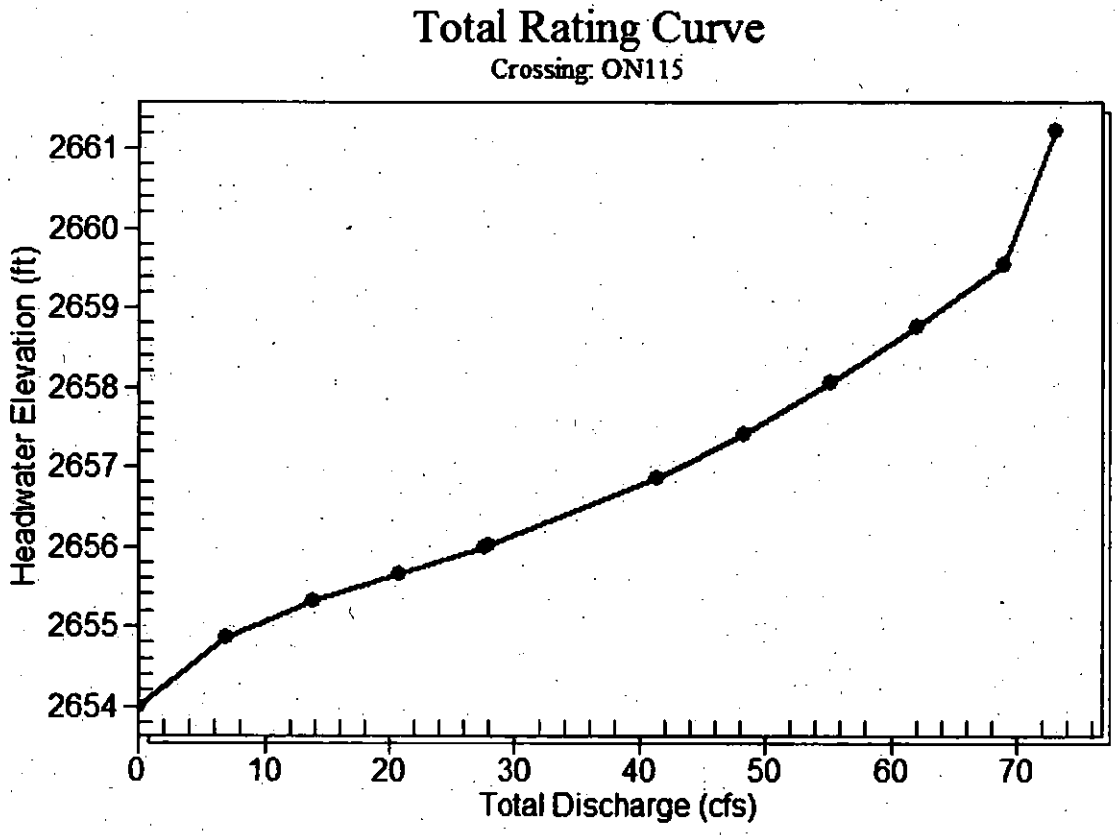


Table 17 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2654.00	0.000	0.000	0-NF	0.000	0.000	1.000	1.000	0.000	0.000
6.90	6.90	2654.87	0.867	0.030	1-S2n	0.397	0.647	0.417	1.000	7.190	0.000
13.80	13.80	2655.31	1.308	0.121	1-S2n	0.568	0.932	0.610	1.000	8.468	0.000
20.70	20.70	2655.66	1.661	0.423	1-S2n	0.703	1.150	0.772	1.000	9.278	0.000
27.60	27.60	2656.00	2.000	0.820	5-S2n	0.821	1.334	0.919	1.000	9.790	0.000
28.00	28.00	2656.02	2.021	0.844	5-S2n	0.828	1.344	0.927	1.000	9.822	0.000
41.40	41.40	2656.86	2.857	1.908	5-S2n	1.038	1.630	1.175	1.000	10.791	0.000
48.30	48.30	2657.41	3.414	2.357	5-S2n	1.142	1.739	1.294	1.000	11.223	0.000
55.20	55.20	2658.05	4.053	2.853	5-S2n	1.246	1.821	1.409	1.000	11.677	0.000
62.10	62.10	2658.76	4.760	3.397	5-S2n	1.355	1.876	1.518	1.000	12.162	0.000
69.00	69.00	2659.53	5.526	3.972	5-S2n	1.469	1.873	1.624	1.000	12.636	0.000

****

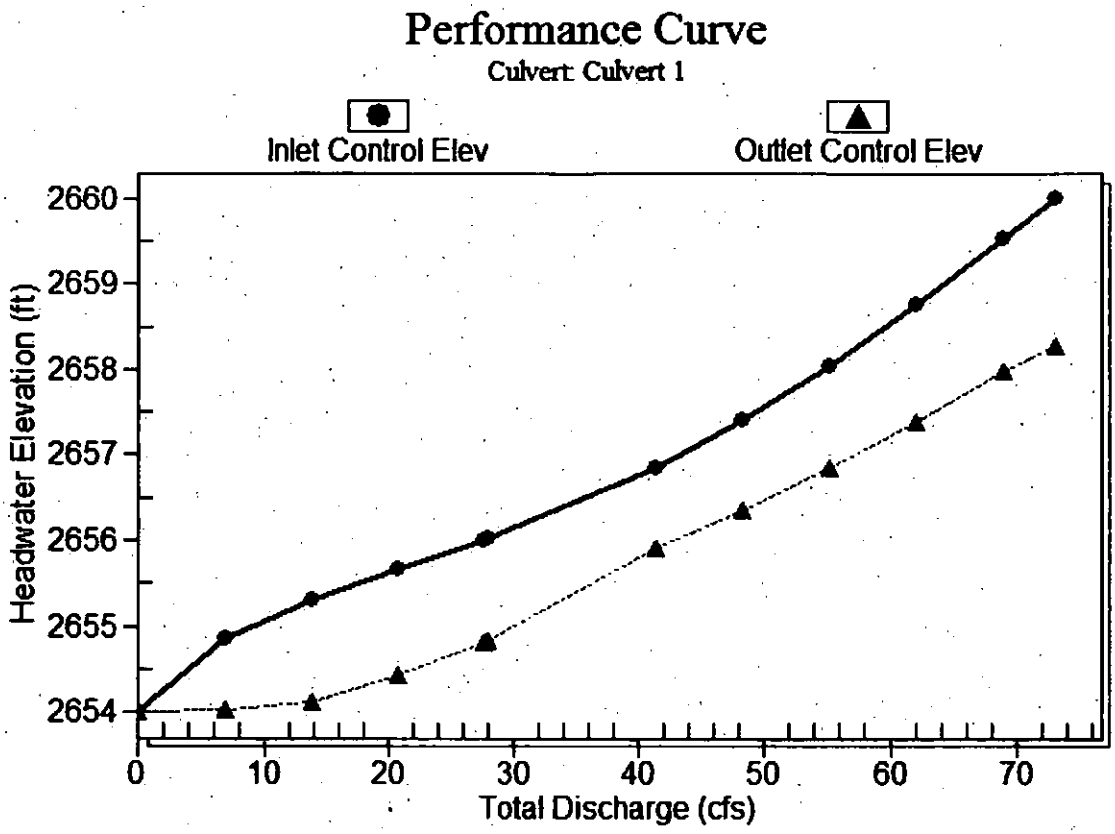
Straight Culvert

Inlet Elevation (invert): 2654.00 ft, Outlet Elevation (invert): 2653.00 ft

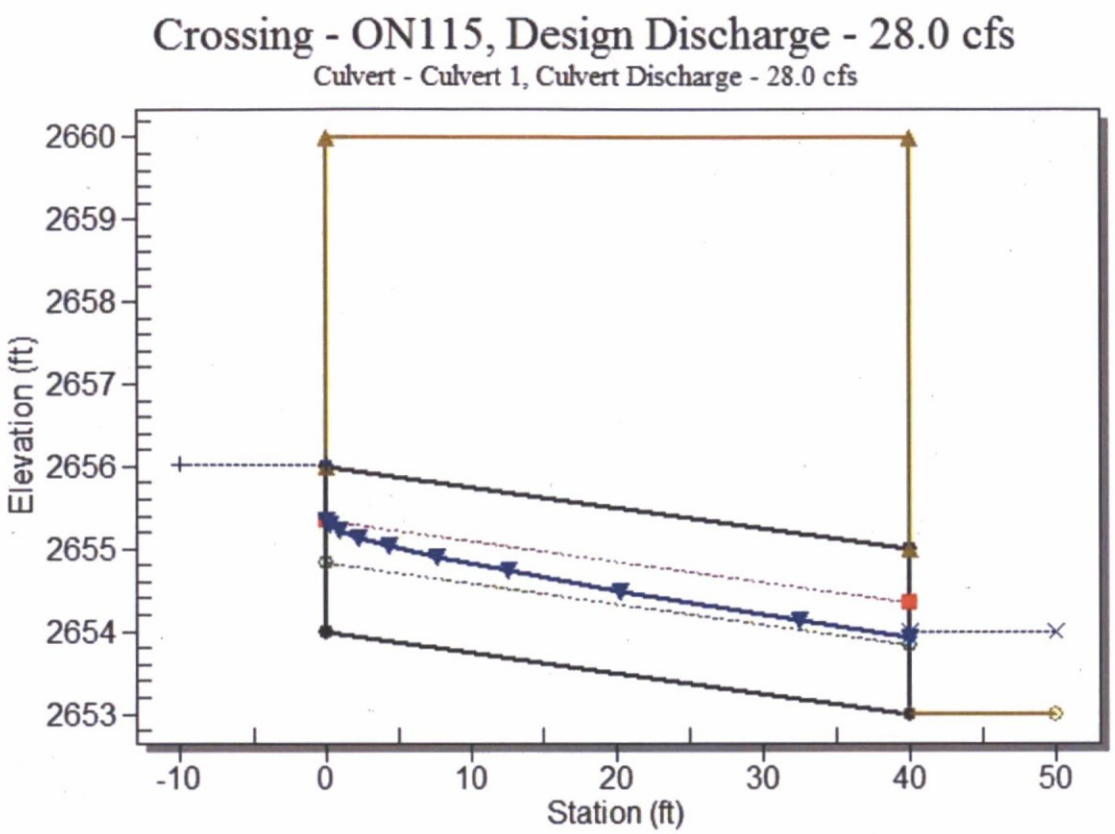
Culvert Length: 40.01 ft, Culvert Slope: 0.0250

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2654.00 ft

Outlet Station: 40.00 ft

Outlet Elevation: 2653.00 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: NONE

Table 18 - Downstream Channel Rating Curve (Crossing: ON115)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	2654.00	1.00
6.90	2654.00	1.00
13.80	2654.00	1.00
20.70	2654.00	1.00
27.60	2654.00	1.00
28.00	2654.00	1.00
41.40	2654.00	1.00
48.30	2654.00	1.00
55.20	2654.00	1.00
62.10	2654.00	1.00
69.00	2654.00	1.00

Tailwater Channel Data - ON115

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2654.00 ft

Roadway Data for Crossing: ON115

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

Crest Elevation: 2660.00 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Culvert: ON-215A

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 11 cfs

Design Flow: 32 cfs

Maximum Flow: 77 cfs

Table 19 - Summary of Culvert Flows at Crossing: ON215A

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2690.96	11.00	11.00	0.00	1
2691.23	17.60	17.60	0.00	1
2691.46	24.20	24.20	0.00	1
2691.70	30.80	30.80	0.00	1
2691.74	32.00	32.00	0.00	1
2692.12	44.00	44.00	0.00	1
2692.30	50.60	50.60	0.00	1
2692.47	57.20	57.20	0.00	1
2692.65	63.80	63.80	0.00	1
2692.82	70.40	70.40	0.00	1
2693.00	77.00	76.86	0.00	16
2693.00	76.85	76.85	0.00	Overtopping

Rating Curve Plot for Crossing: ON215A

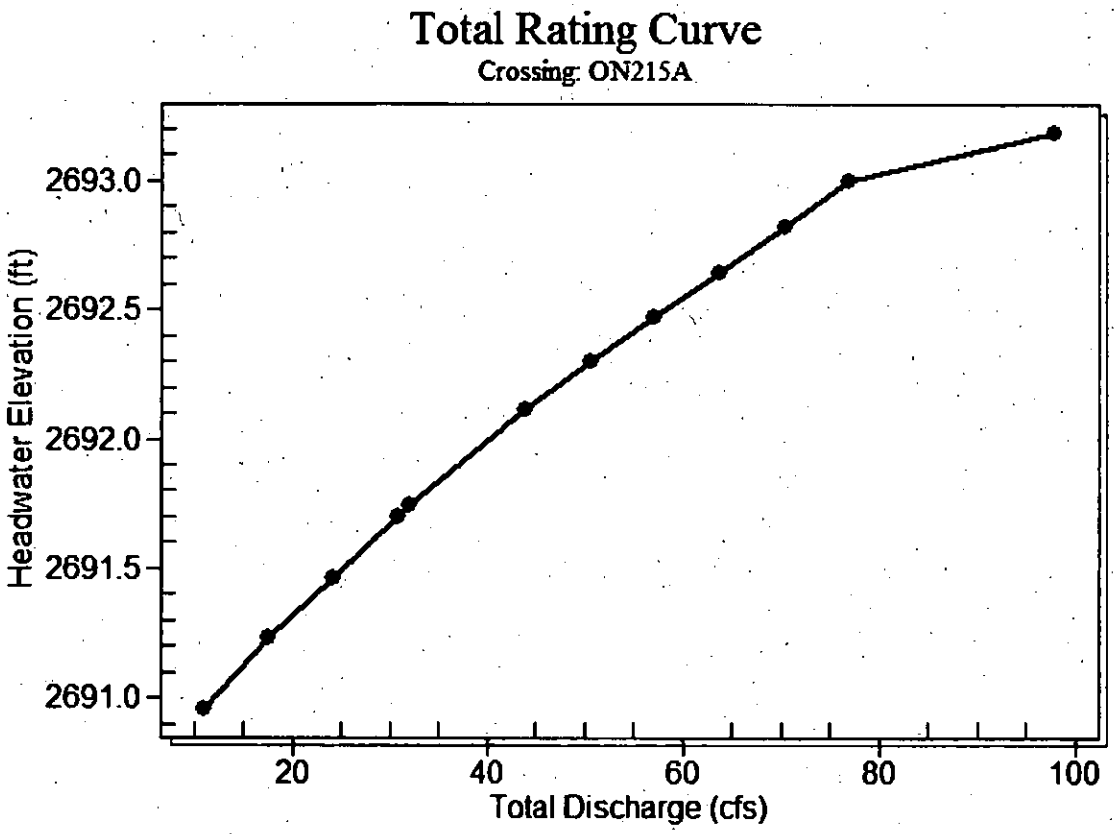


Table 20 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
11.00	11.00	2690.96	0.961	0.0*	1-S2n	0.376	0.732	0.414	1.340	9.022	0.000
17.60	17.60	2691.23	1.232	0.0*	1-S2n	0.489	0.932	0.532	1.340	10.342	0.000
24.20	24.20	2691.46	1.463	0.0*	1-S2n	0.580	1.100	0.640	1.340	10.849	0.000
30.80	30.80	2691.70	1.703	0.0*	1-S2n	0.649	1.249	0.733	1.340	11.430	0.000
32.00	32.00	2691.74	1.744	0.0*	1-S2n	0.661	1.275	0.748	1.340	11.538	0.000
44.00	44.00	2692.12	2.116	0.0*	1-S2n	0.786	1.508	0.898	1.340	12.323	0.000
50.60	50.60	2692.30	2.298	0.0*	1-S2n	0.846	1.619	0.974	1.340	12.675	0.000
57.20	57.20	2692.47	2.473	0.110	1-S2n	0.898	1.727	1.050	1.340	12.955	0.000
63.80	63.80	2692.65	2.646	0.306	1-S2n	0.949	1.829	1.120	1.340	13.271	0.000
70.40	70.40	2692.82	2.822	0.504	1-S2n	1.001	1.924	1.189	1.340	13.482	0.000
77.00	76.86	2693.00	3.000	0.704	5-S2n	1.052	2.012	1.254	1.340	13.715	0.000

* Full Flow Headwater elevation is below inlet invert.

****

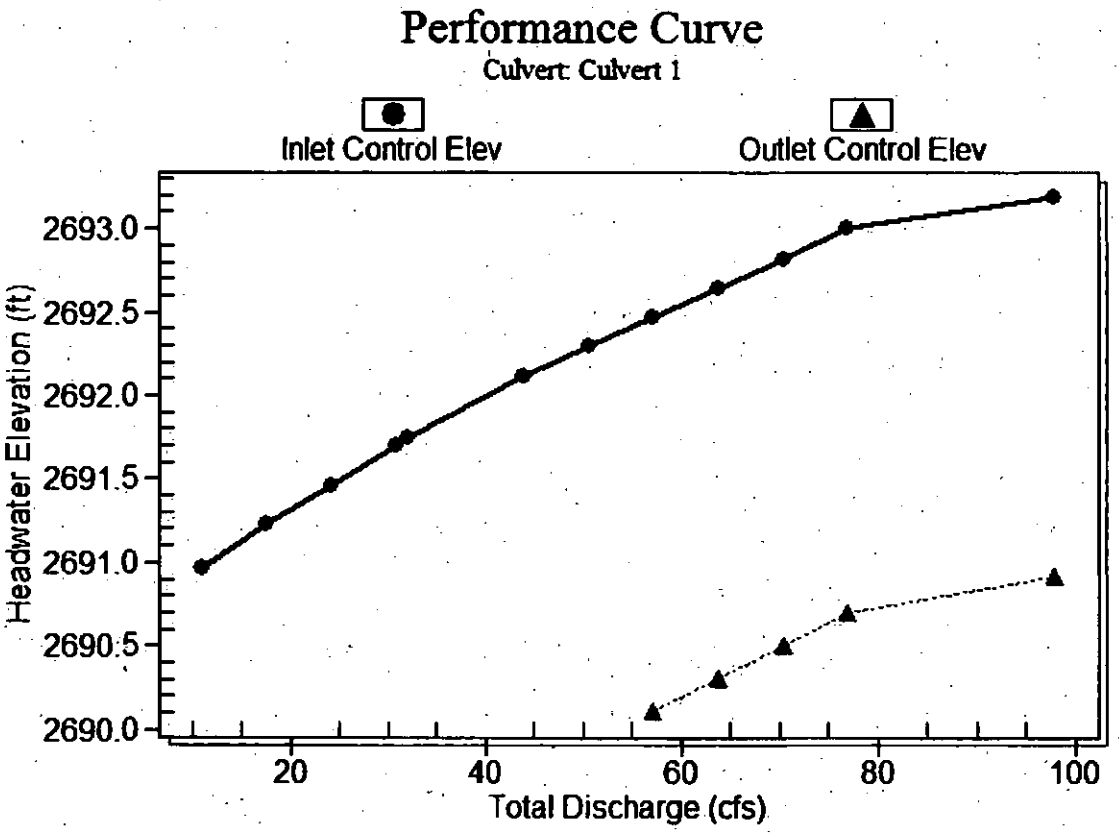
Straight Culvert

Inlet Elevation (invert): 2690.00 ft, Outlet Elevation (invert): 2688.00 ft

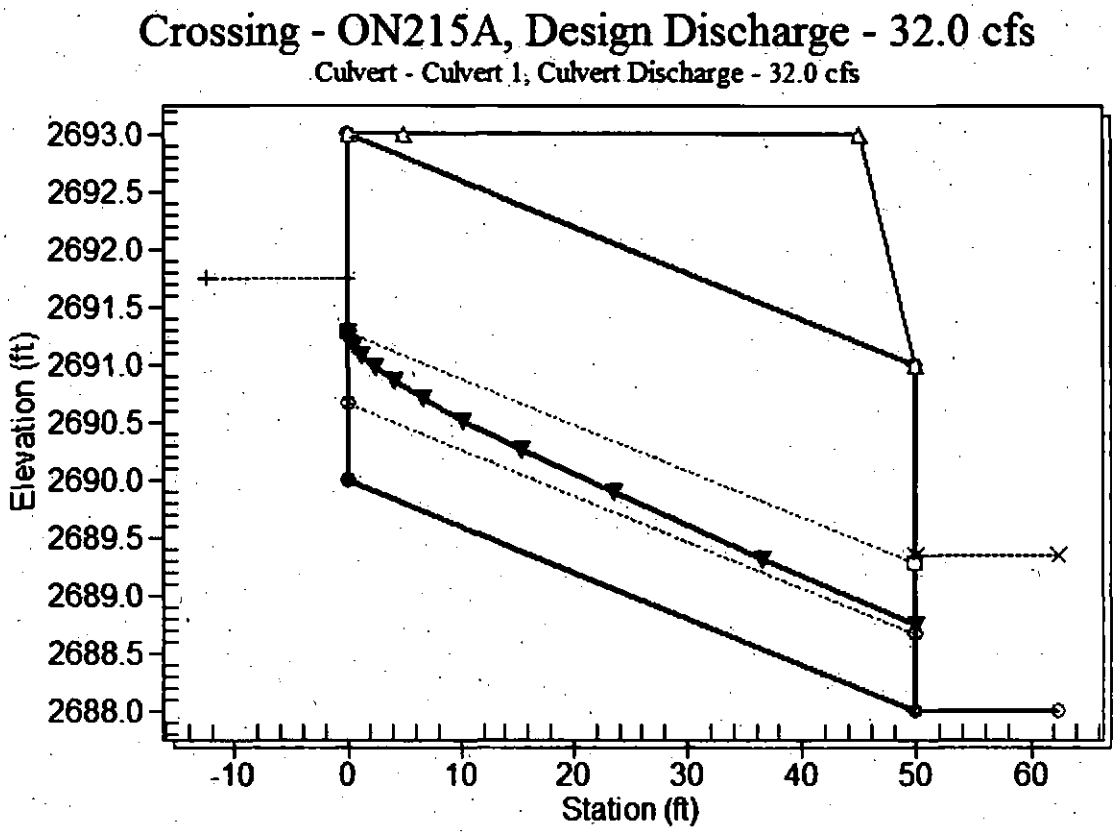
Culvert Length: 50.04 ft, Culvert Slope: 0.0400

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2690.00 ft

Outlet Station: 50.00 ft

Outlet Elevation: 2688.00 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: NONE

Table 21 - Downstream Channel Rating Curve (Crossing: ON215A)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
11.00	2689.34	1.34
17.60	2689.34	1.34
24.20	2689.34	1.34
30.80	2689.34	1.34
32.00	2689.34	1.34
44.00	2689.34	1.34
50.60	2689.34	1.34
57.20	2689.34	1.34
63.80	2689.34	1.34
70.40	2689.34	1.34
77.00	2689.34	1.34

Tailwater Channel Data - ON215A

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2689.34 ft

Roadway Data for Crossing: ON215A

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

Crest Elevation: 2693.00 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

First Flush Spillway/Dissipation Basin Design

Project ***Storyrock***
Subject **First Flush Spillway/Dissipation Basin Design**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: Design First Flush Spillway & Dissipation Basin for Typical Area

First Flush Equivalent Design Storm: 2 Year

Q_2 = 2-8 cfs

Spillway Design:

Top Width	8 Feet
Side Slopes	4:1 H:V
Flow Depth (2 year Design Storm)	0.5 Feet
Capacity[1] (2 year Design Storm)	5 CFS

Dissipation Basin Design:

V =Spillway Velocity[1]	5.25 ft/s
D =Equivalent Opening Width	4 Feet
Riprap $D_{50} = 0.0191*V^2*(0.61)$[2]	6 Inches
Basin Length = 4xD[3]	**16 Feet**

Notes:
(1) Refer to Attached Flowmaster Output for Spillway Hydraulic Design
(2) Per Drainage Design Manual - Hydraulics Equation 6.36, Specific Weight of Stone = 165 lb/ft3
(3) Per Drainage Design Manual - Hydraulics Table 8.6

Worksheet for First Flush Spillway

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.055	
Channel Slope	0.25000	ft/ft
Normal Depth	0.50	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	0.00	ft

Results

Discharge	5.25	ft^3/s
Flow Area	1.00	ft^2
Wetted Perimeter	4.12	ft
Hydraulic Radius	0.24	ft
Top Width	4.00	ft
Critical Depth	0.64	ft
Critical Slope	0.06711	ft/ft
Velocity	5.25	ft/s
Velocity Head	0.43	ft
Specific Energy	0.93	ft
Froude Number	1.85	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.64	ft
Channel Slope	0.25000	ft/ft

Appendix D – Stormwater Storage Waiver

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers:

___ - PA - ____ ____ - ZN - ____ ____ - UP - ____ ____ - DR - ___ ____ - PP - ____ PC#_____

The applicant/developer must complete and submit this form to the city for processing and obtain approval of waiver request ***before submitting improvement plans***. Denial of the waiver may require the developer to submit a revised site plan to the Development Review Board.

Date 10/26/2016 **Project Name** Storyrock

Project Location 128th Street and Ranch Gate Road

Applicant Contact Jason Burm, PE **Company Name** Kimley-Horn and Associates

Phone 480-207-2667 Fax _____ E-mail jason.burm@kimley-horn.com

Address 1855 W. Baseline Road, Suite 200 Mesa, AZ 85202

Waiver Criteria

A project must meet at least one of three criteria listed below for the city to consider waiving some or all required stormwater storage. **However, regardless of the criteria, a waiver will only be granted if the applicant can demonstrate that the effect of a waiver will not increase the potential for flooding on any property.** Check the applicable box and provide a signed engineering report and supporting engineering analysis that demonstrate the project meets the criteria and that the effect of a waiver will not increase the potential for flooding on any property.

If the runoff for the project has been included in a storage facility at another location, the applicant must demonstrate that the stormwater storage facility was specifically designed to accommodate runoff from the subject property and that the runoff will be conveyed to this location through an adequately designed conveyance facility.

☐ 1. The development is adjacent to a conveyance facility that an engineering analysis shows is designed and constructed to handle the additional runoff from the site as a result of development.

☐ 2. The development is on a parcel less than one-half acre in size.

☑ 3. Stormwater storage requirements conflict with requirements of the Environmentally Sensitive Lands Ordinance (ESLO).

For a full storage waiver, a conflict with ESLO is limited to:

- Property located in the hillside landform as defined in the city Zoning Ordinance
- Property in the upper desert landform that has a land slope steeper than 5% as defined in the city Zoning Ordinance
- Property within the ESL zoning overlay district where the only viable location for a stormwater storage basin requires blasting

This full waiver only applies to those portions of property meeting one of these three requirements.

Partial waivers are available for projects or portions of properties within the Environmentally Sensitive Lands Zoning Overlay District, not meeting any of the three full waiver criteria above, if post-development peak discharge rates do not exceed pre-development conditions, based on the 10- and 100-year storm events.

By signing below, I certify that the stated project meets the waiver criteria selected above as demonstrated by the attached documentation.

Engineer _____ Date 10.27.16

Planning, Neighborhood & Transportation Division

7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone: 480-312-2500 • Fax: 480-312-7781

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers:

___ - PA - ___ ___ - ZN - ___ ___ - UP - ___ ___ - DR - ___ ___ - PP - ___ PC#_____

CITY STAFF TO COMPLETE THIS PAGE

Project Name _____

Check Appropriate Boxes:

☐ Meets waiver criteria (specify): ☐ 1 ☐ 2 ☐ 3

☐ Recommend approve waiver.

☐ Recommend deny waiver:
- ☐ None of waiver criteria met.
- ☐ Downstream conditions prohibit waiver of any storage.
- ☐ Other:

Explain: _____

_____

☐ Return waiver request:
- ☐ Insufficient data provided.
- ☐ Other: _____

Explain: _____

_____

Recommended Conditions of Waiver:
- ☐ All storage requirements waived.
- ☐ Post-development peak discharge rates do not exceed pre-development conditions.
- ☐ Other:

Explain: _____

_____

☐ **Waiver approved per above conditions.**

☐ **Waiver denied.**

_____ _____

Floodplain Administrator or Designee Date

Planning, Neighborhood & Transportation Division

7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone: 480-312-2500 • Fax: 480-312-7781

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers:

___ - PA - ____ ____ - ZN - ____ ____ - UP - ____ ____ - DR - ___ ____ - PP - ____ PC#_____

In-Lieu Fee and In-Kind Contributions

In-lieu fees are only applicable to projects where post-development peak discharge rates exceed pre-development levels, based on the 10- and 100-year storm events. If the city grants a waiver, the developer is required to calculate and contribute an in-lieu fee based on what it would cost the city to provide a storage basin, sized as described below, including costs such as land acquisition, construction, landscaping, design, construction management, and maintenance over a 75-year design life. The fee for this cost is $1.87 per cubic foot of stormwater storage for a virtual storage basin designed to mitigate the increase in runoff associated with the 100-year/2-hour storm event. The applicant may submit site-specific in-lieu fee calculations subject to the Floodplain Administrator's approval.

The Floodplain Administrator considers in-kind contributions on a case-by-case basis. An in-kind contribution can serve as part of or instead of the calculated in-lieu fee. In-kind contributions must be stormwater related and must constitute a public benefit. In-lieu fees and in-kind contributions are subject to the approval of the Floodplain Administrator or designee.

Project Name StoryRock

The waived stormwater storage volume is calculated using a simplified approach as follows:

V = ΔCRA; where
V = stormwater storage volume required, in cubic feet,
ΔC = increase in weighted average runoff coefficient over disturbed area ($C_{post} - C_{pre}$),
R = 100-year/2-hour precipitation depth, in feet (DSPM, Appendix 4-1D, page 11), and
A = area of disturbed ground, in square feet

Furthermore,

$V_w = V - V_p$; where
V_w = volume waived,
V = volume required, and
V_p = volume provided

R = _____
ΔC= _____
A = _____
V = _____
V_p= _____
V_w= _____

☐ An in-lieu fee will be paid, based on the following calculations and supporting documentation:
In-lieu fee ($) = V_w (cu. ft.) x $1.87 per cubic foot = _____

☐ An in-kind contribution will be made, as follows:

_____
_____
_____

☐ No in-lieu fee is required. Reason:

_____
_____

Approved by:

_____ _____
Floodplain Administrator or Designee Date

Planning, Neighborhood & Transportation Division
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Appendix E – Preliminary Grading Plan