PRELIMINARY DRAINAGE REPORT

STORYROCK PHASE 1C

SEPTEMBER 2017

Prepared By:

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Contents

Figures

Tables

Appendices

INTRODUCTION

PROJECT DESCRIPTION

This Preliminary Drainage report has been prepared for the proposed Storyrock Phase 1C residential development. StoryRock Phase 1C (Phase 1C) 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 1C is a proposed 120-acre single family residential subdivision consisting of 96 single family residential units. Phase 1C 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 1C is located in the eastern portion 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 1C 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).

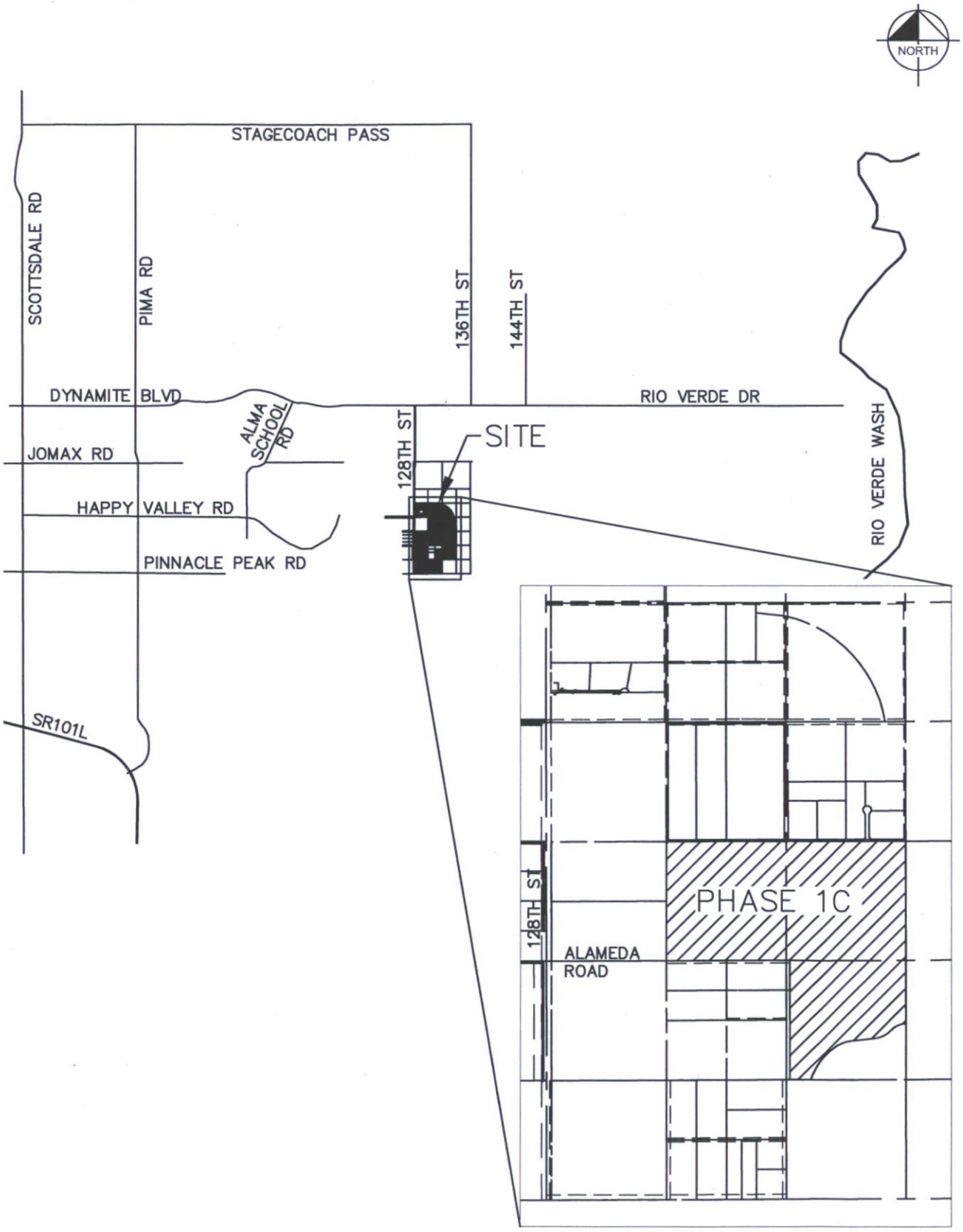

FIGURE 1
VICINITY MAP
STORYROCK

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 1C is located in the eastern portion of the Storyrock development. Phase 1C is bound by other Storyrock phases to the north, west and southwest, an undeveloped residential parcel to the southwest and the McDowell Sonoran Preserve to the east. Storm water runoff impacts Phase 1C from the west and south, and is conveyed through the site in existing washes. Runoff is discharged into Storyrock Phase 1B to the north, and into the Preserve to the east. 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 areas to the west of 128th Street are mostly undeveloped residential properties. The sub-basin to the south and west of Phase 1C are part of other Storyrock Phases. 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

Three significant offsite washes cross Phase 1C 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 three significant washes, and one minor wash 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 1C development consists of 96 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.**

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 1A and Phase 2 drainage plans. Runoff from the western portion of Alameda Road, is accounted for in the Phase 2 drainage plan. Runoff from the eastern portion of Alameda, which impacts Phase 1C, is accounted for in the Phase 1C drainage Plan. The pre-vs post analysis for Phase 1C includes the Alameda proposed sub basins and land uses.

All of the significant washes are maintained within their existing wash corridors. A small portion of Wash160 will be modified to avoid the proposed development. The wash modification will provide a continuous natural wash corridor. Of the approximate 5,500 feet of significant washes within Phase 2, it is proposed to modify approximately 100 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 1C exit points, for the three design storms (2-year, 10-year, and 100-year). Except for two locations, CP7 & CP15, were which the post development flows exceed the existing condition flow by approximately 1-2 cfs and two additional locations, CP8 & CP14, where only the 2 -year post development flows exceed 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. Furthermore, the downstream condition is undeveloped McDowell Sonoran Preserve and the minor increase does not negatively impact any downstream properties. 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 160 (DB160) and DB182 are in-line basins 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. These specific in-line basins experiences depths greater than 3 feet for a very short period during the peak of larger storm events. DB160 and DB182 provides a drain time of 14 and 20 minutes respectively, which helps minimize safety concerns in this location. Furthermore, the basins are located within the private community, setback from pedestrian walkways and a safety rail will be provided at the inlet headwall of the culverts. 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	2	2	7	7	16	16
CP2	17	17	52	52	130	130
CP3	3	3	9	9	23	23
CP4	2	2	7	7	16	16
CP5	2	2	7	7	16	16
CP6	35	35	104	104	265	265
CP7	21	20	61	61	154	153
CP8	3	2	6	6	13	15
CP9	10	10	22	32	70	81
CP10	11	11	24	34	83	89
CP11	2	2	4	5	7	11
CP12	5	6	11	18	24	45
CP13	1	1	2	2	5	5

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)
CP14	5	3	9	9	17	21
CP15	40	39	120	120	308	307

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 "Storwater 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 hydraulic results.

Table 2: Boundary Base Flood Elevation Summary

Wash	HEC-RAS Cross Sections	Ex. Cond BFE	Prop. Cond BFE	Note:
Wash 85	2114	2641.84	2641.77	Site Entrance
Wash 85	933	2600.95	2600.89	Site Exit
Wash 160	241	2545.51	2545.60	Site Exit
Wash 180	139	2549.43	2549.29	Site Exit
Wash 215	1770	2610.51	2610.54	Site Entrance
Wash 215	150	2551.24	2551.27	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.

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 1C 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 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 85	153	13'	20'	31'	50'
Wash 160	83	9'	20'	23'	50'
Wash 180	24	5'	20'	12'	50'
Wash 215	308	18'	20'	44'	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. Stage storage and discharge rate tables are provided in **Appendix B**.

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.

- 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.

Appendix A – Flood Insurance Rate Map

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METE

PANEL 1335L

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

Appendix B – Hydrology

HEC-1 Exhibits (Existing and Proposed Conditions)

- HEC-1 Schematic Map
- Soils Map
- Land Use

DDSMW Output: (Existing and Proposed Conditions)

- Rainfall
- Land use
- Soils
- Storage
- Routing

HEC-1 Output

- Existing Condition
- Proposed Condition

Existing Condition

Flood Control District of Maricopa County
Drainage Design Management System
RAINFALL DATA
Project Reference: STORYROCK PH1A EX

10/26/2016

ID	Method	Duration	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
DEFAULT	NOAA14	5 MIN	0.314	0.423	0.504	0.610	0.689	0.768
	NOAA14	10 MIN	0.478	0.643	0.767	0.928	1.049	1.169
	NOAA14	15 MIN	0.593	0.798	0.951	1.151	1.300	1.449
	NOAA14	30 MIN	0.799	1.074	1.280	1.550	1.750	1.951
	NOAA14	1 HOUR	0.988	1.330	1.584	1.918	2.166	2.415
	NOAA14	2 HOUR	1.123	1.489	1.766	2.138	2.418	2.703
	NOAA14	3 HOUR	1.191	1.551	1.837	2.231	2.541	2.861
	NOAA14	6 HOUR	1.419	1.800	2.105	2.519	2.841	3.174
	NOAA14	12 HOUR	1.703	2.140	2.487	2.957	3.318	3.689
	NOAA14	24 HOUR	2.115	2.752	3.265	3.991	4.576	5.194

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
OFF95	0.064	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)	0.711	0.657	0.579	0.502	0.457	0.422
OFF100	0.011	0.23	253.3	241.8	NATURAL	0.068	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.310	0.289*	0.258*	0.227*	0.208*	0.194 *
												Vel (f/s)	1.09	1.17	1.31	1.49	1.62	1.74
												R (Hrs)	0.407	0.376	0.331	0.288	0.262	0.241
OFF105	0.085	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)	0.678	0.627	0.552	0.479	0.436	0.402
OFF110	0.037	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)	0.595	0.550	0.484	0.420	0.382	0.353
OFF115	0.007	0.13	375.0	283.6	NATURAL	0.071	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.227*	0.211*	0.189*	0.166*	0.152*	0.142 *
												Vel (f/s)	0.84	0.90	1.01	1.15	1.25	1.34
												R (Hrs)	0.236	0.218	0.192	0.167	0.152	0.140
ON135	0.008	0.20	225.6	222.8	NATURAL	0.070	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.301	0.281*	0.250*	0.220*	0.202*	0.188 *
												Vel (f/s)	0.97	1.04	1.17	1.33	1.45	1.56
												R (Hrs)	0.422	0.391	0.344	0.298	0.272	0.251
ON140	0.017	0.36	195.6	195.6	NATURAL	0.066	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.408	0.380	0.339	0.298*	0.274*	0.255 *
												Vel (f/s)	1.29	1.39	1.56	1.77	1.93	2.07
												R (Hrs)	0.616	0.570	0.502	0.435	0.396	0.366
ON145	0.014	0.32	214.3	213.3	NATURAL	0.067	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.377	0.352	0.314	0.276*	0.254*	0.236 *
												Vel (f/s)	1.24	1.33	1.49	1.70	1.85	1.99
												R (Hrs)	0.575	0.531	0.468	0.406	0.369	0.341
ON150	0.007	0.16	250.0	239.9	NATURAL	0.071	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.265*	0.247*	0.220*	0.194*	0.178*	0.166 *
												Vel (f/s)	0.89	0.95	1.07	1.21	1.32	1.41
												R (Hrs)	0.331	0.306	0.270	0.234	0.213	0.196

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: STORYROCK PH1C EX

n	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
F100	DESERT	0.0107	100.0	0.35	0	25.0	DRY	0.068	Desert
		0.0107	**100.0**						
F105	DESERT	0.0851	100.0	0.35	0	25.0	DRY	0.056	Desert
		0.0851	**100.0**						
F110	DESERT	0.0369	100.0	0.35	0	25.0	DRY	0.061	Desert
		0.0369	**100.0**						
F115	DESERT	0.0065	100.0	0.35	0	25.0	DRY	0.071	Desert
		0.0065	**100.0**						
F95	DESERT	0.0642	100.0	0.35	0	25.0	DRY	0.058	Desert
		0.0642	**100.0**						
135	DESERT	0.0082	100.0	0.35	0	25.0	DRY	0.070	Desert
		0.0082	**100.0**						
140	DESERT	0.0167	100.0	0.35	0	25.0	DRY	0.066	Desert
		0.0167	**100.0**						
145	DESERT	0.0137	100.0	0.35	0	25.0	DRY	0.067	Desert
		0.0137	**100.0**						
150	DESERT	0.0067	100.0	0.35	0	25.0	DRY	0.071	Desert
		0.0067	**100.0**						
155	DESERT	0.0175	100.0	0.35	0	25.0	DRY	0.066	Desert
		0.0175	**100.0**						

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: STORYROCK PH1C EX

n	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
210	DESERT	0.0171	100.0	0.35	0	25.0	DRY	0.066	Desert
		0.0171	**100.0**						
215	DESERT	0.0302	100.0	0.35	0	25.0	DRY	0.062	Desert
		0.0302	**100.0**						
220	DESERT	0.0028	100.0	0.35	0	25.0	DRY	0.076	Desert
		0.0028	**100.0**						
235	DESERT	0.0024	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0024	**100.0**						
240	DESERT	0.0071	100.0	0.35	0	25.0	DRY	0.071	Desert
		0.0071	**100.0**						
245	DESERT	0.0033	100.0	0.35	0	25.0	DRY	0.076	Desert
		0.0033	**100.0**						
260	DESERT	0.0026	100.0	0.35	0	25.0	DRY	0.076	Desert
		0.0026	**100.0**						
265	DESERT	0.0018	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0018	**100.0**						
270	DESERT	0.0022	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0022	**100.0**						
280	DESERT	0.0008	100.0	0.35	0	25.0	DRY	0.083	Desert
		0.0008	**100.0**						

* Non default value

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	
OFF95	645	61	64561	0.064	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	
ON155	645	61	64561	0.018	100.00	0.150	-	100	
ON160	645	61	64561	0.037	100.00	0.150	-	100	
ON165	645	61	64561	0.008	100.00	0.150	-	100	
ON170	645	61	64561	0.006	100.00	0.150	-	100	
ON175	645	61	64561	0.005	100.00	0.150	-	100	
ON180	645	61	64561	0.024	100.00	0.150	-	100	
ON185	645	61	64561	0.002	100.00	0.150	-	100	
ON190	645	61	64561	0.013	100.00	0.150	-	100	
ON195	645	61	64561	0.009	100.00	0.150	-	100	
ON200	645	61	64561	0.007	100.00	0.150	-	100	
ON205	645	61	64561	0.019	100.00	0.150	-	100	
ON210	645	61	64561	0.017	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	
ON235	645	61	64561	0.002	100.00	0.150	-	100	
ON240	645	61	64561	0.007	100.00	0.150	-	100	
ON245	645	61	64561	0.003	100.00	0.150	-	100	
ON260	645	61	64561	0.003	100.00	0.150	-	100	
ON265	645	61	64561	0.002	100.00	0.150	-	100	
ON270	645	61	64561	0.002	100.00	0.150	-	100	
ON280	645	61	64561	0.001	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: 1" = 1800'
SCALE(V): N/A
DESIGNED BY: MAW
DRAWN BY: DHT
CHECKED BY: MAW
DATE: AUGUST 2014

CAVALLIERE
EXISTING SOILS MAP

PROJECT NO.
191069013

DRAWING NAME
Existing_Soils.mxd

Flood Control District of Maricopa County
Drainage Design Management System
HEC-1 ROUTING DATA
Project Reference: STORYROCK PH1C 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															
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
RO155A	0.050	0.035	0.050	805.00	0.2900	-	X:	-	9.00	18.00	22.00	22.10	27.00	32.00	43.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO155B	0.050	0.035	0.050	910.00	0.0350	-	X:	-	16.00	61.00	76.00	90.00	121.00	200.00	226.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO155C	0.050	0.035	0.050	392.00	0.0330	-	X:	-	14.00	22.00	30.00	42.00	54.00	68.00	90.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO160A	0.050	0.035	0.050	860.00	0.0300	-	X:	-	9.00	16.00	19.00	19.10	22.00	25.00	32.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO160B	0.050	0.035	0.050	1,090.00	0.0300	-	X:	-	6.00	10.00	14.00	16.00	18.00	22.00	28.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO160C	0.050	0.035	0.050	1,952.00	0.0300	-	X:	-	12.00	20.00	29.00	36.00	40.00	50.00	54.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO170	0.050	0.035	0.050	585.00	0.0310	-	X:	-	1.00	3.00	4.00	10.00	11.00	15.00	20.00
							Y:	2.00	2.00	2.00	-	-	2.00	2.00	2.00
RO180	0.050	0.035	0.050	2,300.00	0.0340	-	X:	-	16.00	24.00	28.00	29.00	36.00	58.00	95.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00

Flood Control District of Maricopa County
Drainage Design Management System
HEC-1 ROUTING DATA
Project Reference: STORYROCK PH1C EX

10/27/2016

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
RO200A	0.050	0.035	0.050	611.00	0.0360	-	X:	-	5.00	12.00	45.00	61.00	68.00	73.00	78.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO200B	0.050	0.035	0.050	345.00	0.0290	-	X:	-	6.00	12.00	20.00	21.00	41.00	47.00	51.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO205	0.050	0.035	0.050	1,565.00	0.0370	-	X:	-	6.00	10.00	15.00	48.00	58.00	64.00	77.00
							Y:	4.00	2.00	1.00	-	-	1.00	2.00	4.00
RO210	0.050	0.035	0.050	1,804.00	0.0380	-	X:	-	2.00	4.00	5.00	10.00	12.00	14.00	18.00
							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
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
RO240A	0.050	0.035	0.050	245.00	0.0370	-	X:	-	5.00	10.00	14.00	32.00	41.00	48.00	52.00
							Y:	3.00	2.00	1.00	-	-	1.00	2.00	3.00
RO240B	0.050	0.035	0.050	465.00	0.0390	-	X:	-	7.00	19.00	49.00	65.00	70.00	77.00	85.00
							Y:	2.00	0.50	1.00	-	-	1.00	-	2.00
RO260A	0.050	0.035	0.050	225.00	0.0360	-	X:	-	7.00	15.00	26.00	29.00	34.00	42.00	50.00
							Y:	2.00	1.00	-	-	1.00	1.00	0.50	1.00

Flood Control District of Maricopa County
Drainage Design Management System
HEC-1 ROUTING DATA
Project Reference: STORYROCK PH1C 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.
RO260B	0.050	0.035	0.050	361.00	0.0280	-	X:	-	23.00	44.00	69.00	70.00	85.00	92.00	104.00
							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   27OCT16  TIME  18:23:18   *
*                                       *
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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

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1      ID       Flood Control District of Maricopa County
   2      ID       STORYROCK PH1C EX - STORYROCK PHASE 1C 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      KK  OFF95   BASIN
  20      BA  0.064
  21      LG   0.35    0.40   6.00   0.18      0
  22      UC  0.545   0.711
  23      UA      0     3.0    5.0    8.0   12.0   20.0   43.0   75.0   90.0   96.0
  24      UA    100
          *

  25      KK  RO140A  ROUTE
  26      RS      1    FLOW
  27      RC  0.050   0.035  0.050    333 0.0270   0.00
  28      RX   0.00   27.00  30.00  34.00  34.20  40.00  47.00  82.00
  29      RY   3.00    2.00   1.00   0.00   0.00   1.00   2.00   3.00
          *

  30      KK  OFF100  BASIN
  31      BA  0.011
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      34          UA      0    3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      35          UA    100
                  *

      36          KK  RO140B   ROUTE
      37          RS       1    FLOW
      38          RC   0.050   0.035   0.050     626  0.0340    0.00
      39          RX    0.00    7.00    8.00   11.00   11.20   14.00   16.00   31.00
      40          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                  *
1                                       HEC-1 INPUT                                 PAGE  2

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

      41          KK  CO140A COMBINE
      42          HC       2
                  *

      43          KK  RO140C   ROUTE
      44          RS       1    FLOW
      45          RC   0.050   0.035   0.050    1210  0.0320    0.00
      46          RX    0.00    3.00    6.00   11.00   11.20   17.00   23.00   48.00
      47          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                  *

      48          KK   ON140   BASIN
      49          BA   0.017
      50          LG    0.35    0.40    6.00    0.18       0
      51          UC   0.408   0.616
      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  CO140B COMBINE
      55          HC       2
                  *

      56          KK  RO155B   ROUTE
      57          RS       1    FLOW
      58          RC   0.050   0.035   0.050     910  0.0350    0.00
      59          RX    0.00   16.00   61.00   76.00   90.00  121.00  200.00  226.00
      60          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                  *

      61          KK   ON135   BASIN
      62          BA   0.008
      63          LG    0.35    0.40    6.00    0.18       0
      64          UC   0.301   0.422
      65          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
      66          UA     100
                  *

      67          KK  RO155A   ROUTE
      68          RS       1    FLOW
      69          RC   0.050   0.035   0.050     805  0.2900    0.00
      70          RX    0.00    9.00   18.00   22.00   22.10   27.00   32.00   43.00
      71          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                  *

      72          KK  CO155A COMBINE
      73          HC       2
                  *
1                                       HEC-1 INPUT                                 PAGE  3

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

      74          KK  RO155C   ROUTE
      75          RS       1    FLOW
      76          RC   0.050   0.035   0.050     392  0.0330    0.00
      77          RX    0.00   14.00   22.00   30.00   42.00   54.00   68.00   90.00
      78          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                  *

      79          KK   ON155   BASIN
      80          BA   0.017
      81          LG    0.35    0.40    6.00    0.18       0
```

```
 83          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 84          UA     100
             *

 85          KK  CO155B COMBINE
 86          HC       2
             *

 87          KK   ON145   BASIN
 88          BA   0.014
 89          LG    0.35    0.40    6.00    0.18       0
 90          UC   0.377   0.575
 91          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 92          UA     100
             *

 93          KK  RO160A   ROUTE
 94          RS       1    FLOW
 95          RC   0.050   0.035   0.050     860  0.0300    0.00
 96          RX    0.00    9.00   16.00   19.00   19.10   22.00   25.00   32.00
 97          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 98          KK   ON150   BASIN
 99          BA   0.007
100          LG    0.35    0.40    6.00    0.18       0
101          UC   0.265   0.331
102          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
103          UA     100
             *

104          KK  RO160B   ROUTE
105          RS       1    FLOW
106          RC   0.050   0.035   0.050    1090  0.0300    0.00
107          RX    0.00    6.00   10.00   14.00   16.00   18.00   22.00   28.00
108          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

109          KK  CO160A COMBINE
110          HC       2
             *

111          KK  RO160C   ROUTE
112          RS       1    FLOW
113          RC   0.050   0.035   0.050    1952  0.0300    0.00
114          RX    0.00   12.00   20.00   29.00   36.00   40.00   50.00   54.00
115          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

116          KK   ON160   BASIN
117          BA   0.037
118          LG    0.35    0.40    6.00    0.18       0
119          UC   0.520   0.790
120          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
121          UA     100
             *

122          KK  CO160B COMBINE
123          HC       2
             *

124          KK   RO170   ROUTE
125          RS       1    FLOW
126          RC   0.050   0.035   0.050     585  0.0310    0.00
127          RX    0.00    1.00    3.00    4.00   10.00   11.00   15.00   20.00
128          RY    2.00    2.00    2.00    0.00    0.00    2.00    2.00    2.00
             *

129          KK   ON170   BASIN
130          BA   0.006
131          LG    0.35    0.40    6.00    0.18       0
132          UC   0.258   0.316
133          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
```

```
135          KK   CO170 COMBINE
136          HC       2
             *

137          KK   ON165   BASIN
138          BA   0.008
139          LG    0.35    0.40    6.00    0.18       0
140          UC   0.312   0.475
141          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
142          UA     100
             *
1                                        HEC-1 INPUT                                    PAGE  5

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

143          KK   ON175   BASIN
144          BA   0.005
145          LG    0.35    0.40    6.00    0.18       0
146          UC   0.257   0.368
147          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
148          UA     100
             *

149          KK   ON180   BASIN
150          BA   0.024
151          LG    0.35    0.40    6.00    0.18       0
152          UC   0.463   0.758
153          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
154          UA     100
             *

155          KK   COEX1 COMBINE
156          HC       4
             *

157          KK   ON195   BASIN
158          BA   0.009
159          LG    0.35    0.40    6.00    0.18       0
160          UC   0.327   0.484
161          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
162          UA     100
             *

163          KK   RO180   ROUTE
164          RS       1    FLOW
165          RC   0.050   0.035   0.050    2300  0.0340    0.00
166          RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
167          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

168          KK   CO180 COMBINE
169          HC       2
             *

170          KK   ON185   BASIN
171          BA   0.002
172          LG    0.35    0.40    6.00    0.18       0
173          UC   0.181   0.228
174          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
175          UA     100
             *

176          KK   ON190   BASIN
177          BA   0.013
178          LG    0.35    0.40    6.00    0.18       0
179          UC   0.370   0.587
180          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
181          UA     100
             *
1                                        HEC-1 INPUT                                    PAGE  6

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

182          KK  OFF105   BASIN
```

```
185          UC   0.538   0.678
186          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
187          UA     100
             *

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

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

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

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

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

216          KK   CO220 COMBINE
217          HC       2
             *
```



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

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

223          KK  CO215A COMBINE
224          HC       2
             *

225          KK  RO215B   ROUTE
226          RS       1    FLOW
227          RC   0.050   0.035   0.050     800  0.0340    0.00
228          RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
229          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

230          KK  CO215B COMBINE
231          HC       2
             *

232          KK  RO215C   ROUTE
233          RS       1    FLOW
234          RC   0.050   0.035   0.050     445  0.0340    0.00
235          RX    0.00   12.00   28.00   36.00   48.00   71.00   73.00   76.00
```

```
 237           KK   ON215   BASIN
 238           BA   0.030
 239           LG    0.35    0.40    6.00    0.18       0
 240           UC   0.349   0.341
 241           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 242           UA     100
               *

 243           KK  CO215C COMBINE
 244           HC       2
               *

 245           KK  RO240A   ROUTE
 246           RS       1    FLOW
 247           RC   0.050   0.035   0.050     245  0.0370    0.00
 248           RX    0.00    5.00   10.00   14.00   32.00   41.00   48.00   52.00
 249           RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
               *

 250           KK   ON235   BASIN
 251           BA   0.002
 252           LG    0.35    0.40    6.00    0.18       0
 253           UC   0.176   0.222
 254           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 255           UA     100
               *
1                                            HEC-1 INPUT                                             PAGE  8

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

 256           KK  CO240A COMBINE
 257           HC       2
               *

 258           KK  RO240B   ROUTE
 259           RS       1    FLOW
 260           RC   0.050   0.035   0.050     465  0.0390    0.00
 261           RX    0.00    7.00   19.00   49.00   65.00   70.00   77.00   85.00
 262           RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
               *

 263           KK   ON240   BASIN
 264           BA   0.007
 265           LG    0.35    0.40    6.00    0.18       0
 266           UC   0.276   0.380
 267           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 268           UA     100
               *

 269           KK  CO240B COMBINE
 270           HC       2
               *

 271           KK  RO260A   ROUTE
 272           RS       1    FLOW
 273           RC   0.050   0.035   0.050     225  0.0360    0.00
 274           RX    0.00    7.00   15.00   26.00   29.00   34.00   42.00   50.00
 275           RY    2.00    1.00    0.00    0.00    1.00    1.00    0.50    1.00
               *

 276           KK   ON245   BASIN
 277           BA   0.003
 278           LG    0.35    0.40    6.00    0.18       0
 279           UC   0.230   0.363
 280           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 281           UA     100
               *

 282           KK  RO260B   ROUTE
 283           RS       1    FLOW
 284           RC   0.050   0.035   0.050     361  0.0280    0.00
 285           RX    0.00   23.00   44.00   69.00   70.00   85.00   92.00  104.00
 286           RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
               *
```

```
289          LG    0.35    0.40    6.00    0.18       0
290          UC   0.212   0.265
291          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
292          UA     100
             *
```



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

293          KK   CO260 COMBINE
294          HC       3
             *

295          KK   RO200A   ROUTE
296          RS        1    FLOW
297          RC   0.050   0.035   0.050     611  0.0360    0.00
298          RX    0.00    5.00   12.00   45.00   61.00   68.00   73.00   78.00
299          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

300          KK   ON265   BASIN
301          BA   0.002
302          LG    0.35    0.40    6.00    0.18       0
303          UC   0.203   0.318
304          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
305          UA     100
             *

306          KK   RO200B   ROUTE
307          RS        1    FLOW
308          RC   0.050   0.035   0.050     345  0.0290    0.00
309          RX    0.00    6.00   12.00   20.00   21.00   41.00   47.00   51.00
310          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

311          KK   ON200   BASIN
312          BA   0.007
313          LG    0.35    0.40    6.00    0.18       0
314          UC   0.247   0.290
315          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
316          UA     100
             *

317          KK   ON270   BASIN
318          BA   0.002
319          LG    0.35    0.40    6.00    0.18       0
320          UC   0.193   0.273
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   CO200 COMBINE
324          HC       4
             *

325          KK   RO205   ROUTE
326          RS        1    FLOW
327          RC   0.050   0.035   0.050    1565  0.0370    0.00
328          RX    0.00    6.00   10.00   15.00   48.00   58.00   64.00   77.00
329          RY    4.00    2.00    1.00    0.00    0.00    1.00    2.00    4.00
             *
```



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

330          KK   ON205   BASIN
331          BA   0.019
332          LG    0.35    0.40    6.00    0.18       0
333          UC   0.374   0.489
334          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
335          UA     100
             *

336          KK   ON280   BASIN
337          BA   0.001
```

```
          340          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          341          UA     100
                       *

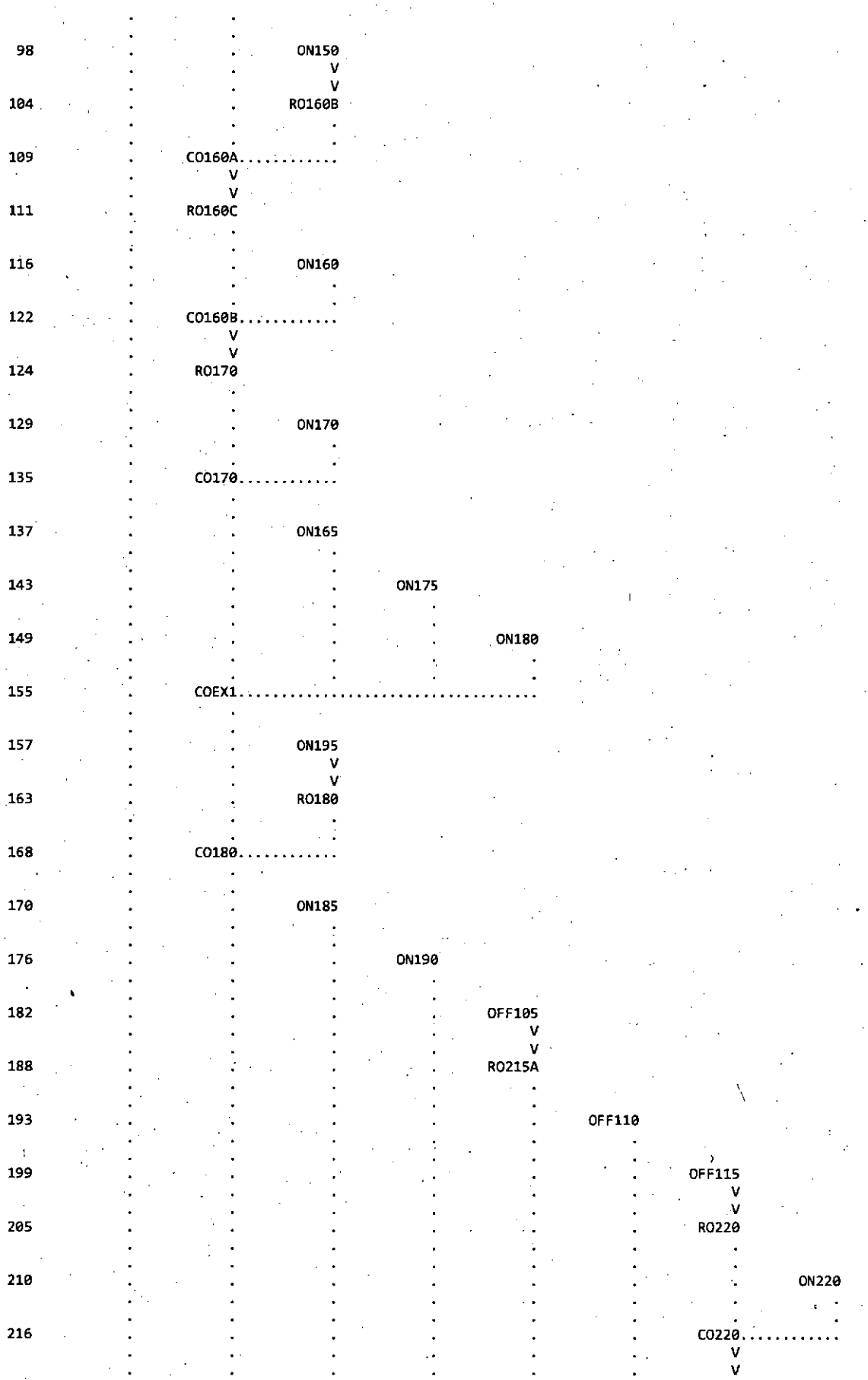
          342          KK   RO210   ROUTE
          343          RS       1    FLOW       \
          344          RC   0.050   0.035   0.050    1804  0.0380    0.00
          345          RX    0.00    2.00    4.00    5.00   10.00   12.00   14.00   18.00
          346          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                       *

          347          KK   ON210   BASIN
          348          BA   0.017
          349          LG    0.35    0.40    6.00    0.18       0
          350          UC   0.403   0.608
          351          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          352          UA     100
                       *

          353          KK   CO205 COMBINE
          354          HC       4
                       *
          355          ZZ
1
                    SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

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

    19       OFF95
                V
                V
    25       RO140A
                .
                .
    30          .       OFF100
                .          V
                .          V
    36          .       RO140B
                .          .
                .          .
    41       CO140A.............
                V
                V
    43       RO140C
                .
                .
    48          .        ON140
                .          .
                .          .
    54       CO140B.............
                V
                V
    56       RO155B
                .
                .
    61          .        ON135
                .          V
                .          V
    67          .       RO155A
                .          .
                .          .
    72       CO155A.............
                V
                V
    74       RO155C
                .
                .
    79          .        ON155
                .          .
                .          .
    85       CO155B.............
                .
                .
    87          .        ON145
                .          V
```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109
CO160A
111
RO160C
116
ON160
122
CO160B
124
RO170
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CO170
137
ON165
143
ON175
149
ON180
155
COEX1
157
ON195
163
RO180
168
CO180
170
ON185
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OFF110
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OFF115
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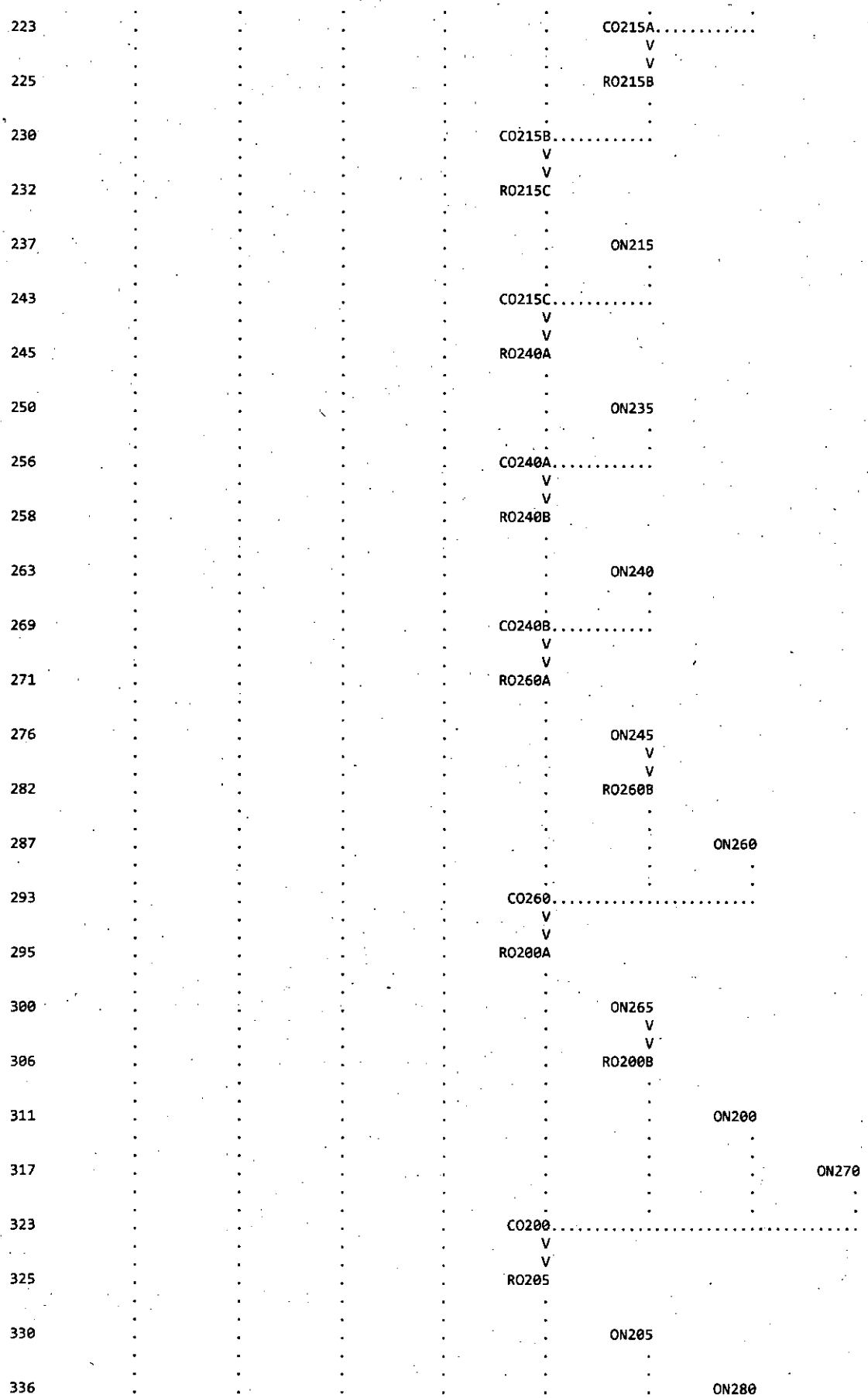
RO220
210
ON220
216
CO220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RO215B
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CO215B
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RO215C
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ON215
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CO215C
245
RO240A
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ON235
256
CO240A
258
RO240B
263
ON240
269
CO240B
271
RO260A
276
ON245
282
RO260B
287
ON260
293
CO260
295
RO200A
300
ON265
306
RO200B
311
ON200
317
ON270
323
CO200
325
RO205
330
ON205
336
ON280

```
 342        .        .        .        .        .        .        RO210
            .        .        .        .        .        .        .
            .        .        .        .        .        .        .
 347        .        .        .        .        .        .        .        ON210
            .        .        .        .        .        .        .        .
            .        .        .        .        .        .        .        .
 353        .        .        .        .     CO205.................................

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

```
1*****************************************                                     ****************************************
*                                         *                                     *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *                                     *   U.S. ARMY CORPS OF ENGINEERS       *
*             JUN   1998                  *                                     *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                   *                                     *        609 SECOND STREET             *
*                                         *                                     *   DAVIS, CALIFORNIA 95616            *
*  RUN DATE   27OCT16  TIME  18:23:18     *                                     *        (916) 756-1104                *
*                                         *                                     *                                      *
*****************************************                                      ****************************************
```

```
                          Flood Control District of Maricopa County
                          STORYROCK PH1C EX - STORYROCK PHASE 1C 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
                         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       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	0.01	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								

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	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		
+	ROUTED TO	RO155B	16.	4.58	3.	1.	0.	0.09		
+	HYDROGRAPH AT	ON135	2.	4.25	0.	0.	0.	0.01		
+	ROUTED TO	RO155A	2.	4.25	0.	0.	0.	0.01		
+	2 COMBINED AT	CO155A	18.	4.58	3.	1.	0.	0.10		
+	ROUTED TO	RO155C	18.	4.58	3.	1.	0.	0.10		
+	HYDROGRAPH AT	ON155	5.	4.25	1.	0.	0.	0.02		
+	2 COMBINED AT	CO155B	20.	4.58	4.	1.	0.	0.12		
+	HYDROGRAPH AT	ON145	3.	4.25	0.	0.	0.	0.01		
+	ROUTED TO	RO160A	3.	4.33	0.	0.	0.	0.01		
+	HYDROGRAPH AT	ON150	2.	4.17	0.	0.	0.	0.01		
+	ROUTED TO	RO160B	2.	4.25	0.	0.	0.	0.01		
+	2 COMBINED AT	CO160A	5.	4.33	1.	0.	0.	0.02		
+	ROUTED TO	RO160C	4.	4.50	1.	0.	0.	0.02		

	2 COMBINED AT						
+	CO160B	10.	4.42	2.	0.	0.	0.06
	ROUTED TO						
+	RO170	10.	4.50	2.	0.	0.	0.06
	HYDROGRAPH AT						
+	ON170	2.	4.17	0.	0.	0.	0.01
	2 COMBINED AT						
+	CO170	11.	4.50	2.	1.	0.	0.06
	HYDROGRAPH AT						
+	ON165	2.	4.25	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	ON175	2.	4.17	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	ON180	5.	4.33	1.	0.	0.	0.02
	4 COMBINED AT						
+	COEX1	18.	4.42	3.	1.	0.	0.10
	HYDROGRAPH AT						
+	ON195	2.	4.25	0.	0.	0.	0.01
	ROUTED TO						
+	RO180	2.	4.42	0.	0.	0.	0.01
	2 COMBINED AT						
+	CO180	20.	4.42	3.	1.	0.	0.11
	HYDROGRAPH AT						
+	ON185	1.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	ON190	3.	4.25	0.	0.	0.	0.01
	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						
+	CO220	4.	4.17	0.	0.	0.	0.01
	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						

```
 135          KK   CO170 COMBINE
 136          HC       2
              *

 137          KK   ON165   BASIN
 138          BA   0.008
 139          LG    0.35    0.40    6.00    0.18       0
 140          UC   0.260   0.387
 141          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 142          UA     100
              *
1                                        HEC-1 INPUT                                    PAGE  5

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

 143          KK   ON175   BASIN
 144          BA   0.005
 145          LG    0.35    0.40    6.00    0.18       0
 146          UC   0.214   0.300
 147          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 148          UA     100
              *

 149          KK   ON180   BASIN
 150          BA   0.024
 151          LG    0.35    0.40    6.00    0.18       0
 152          UC   0.385   0.617
 153          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 154          UA     100
              *

 155          KK   COEX1 COMBINE
 156          HC       4
              *

 157          KK   ON195   BASIN
 158          BA   0.009
 159          LG    0.35    0.40    6.00    0.18       0
 160          UC   0.272   0.394
 161          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 162          UA     100
              *

 163          KK   RO180   ROUTE
 164          RS       1    FLOW
 165          RC   0.050   0.035   0.050    2300  0.0340    0.00
 166          RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
 167          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

 168          KK   CO180 COMBINE
 169          HC       2
              *

 170          KK   ON185   BASIN
 171          BA   0.002
 172          LG    0.35    0.40    6.00    0.18       0
 173          UC   0.150   0.186
 174          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 175          UA     100
              *

 176          KK   ON190   BASIN
 177          BA   0.013
 178          LG    0.35    0.40    6.00    0.18       0
 179          UC   0.308   0.478
 180          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 181          UA     100
              *
1                                        HEC-1 INPUT                                    PAGE  6

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

 182          KK  OFF105   BASIN
```

```
185          UC   0.447   0.552
186          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
187          UA     100
             *

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

193          KK  OFF110   BASIN
194          BA   0.037
195          LG    0.35    0.40    6.00    0.18       0
196          UC   0.356   0.484
197          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
198          UA     100
             *

199          KK  OFF115   BASIN
200          BA   0.007
201          LG    0.35    0.40    6.00    0.18       0
202          UC   0.189   0.192
203          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
204          UA     100
             *

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

210          KK   ON220   BASIN
211          BA   0.003
212          LG    0.35    0.40    6.00    0.18       0
213          UC   0.184   0.266
214          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
215          UA     100
             *

216          KK   CO220 COMBINE
217          HC       2
             *
```



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

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

223          KK  CO215A COMBINE
224          HC       2
             *

225          KK  RO215B   ROUTE
226          RS       1    FLOW
227          RC   0.050   0.035   0.050     800  0.0340    0.00
228          RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
229          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

230          KK  CO215B COMBINE
231          HC       2
             *

232          KK  RO215C   ROUTE
233          RS       1    FLOW
234          RC   0.050   0.035   0.050     445  0.0340    0.00
235          RX    0.00   12.00   28.00   36.00   48.00   71.00   73.00   76.00
```

```
        237          KK   ON215   BASIN
        238          BA   0.030
        239          LG    0.35    0.40    6.00    0.18       0
        240          UC   0.290   0.278
        241          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
        242          UA     100
                     *

        243          KK  CO215C COMBINE
        244          HC       2
                     *

        245          KK  RO240A   ROUTE
        246          RS       1    FLOW
        247          RC   0.050   0.035   0.050     245  0.0370    0.00
        248          RX    0.00    5.00   10.00   14.00   32.00   41.00   48.00   52.00
        249          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                     *

        250          KK   ON235   BASIN
        251          BA   0.002
        252          LG    0.35    0.40    6.00    0.18       0
        253          UC   0.146   0.181
        254          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
        255          UA     100
                     *
1                                           HEC-1 INPUT                                             PAGE  8

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

        256          KK  CO240A COMBINE
        257          HC       2
                     *

        258          KK  RO240B   ROUTE
        259          RS       1    FLOW
        260          RC   0.050   0.035   0.050     465  0.0390    0.00
        261          RX    0.00    7.00   19.00   49.00   65.00   70.00   77.00   85.00
        262          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                     *

        263          KK   ON240   BASIN
        264          BA   0.007
        265          LG    0.35    0.40    6.00    0.18       0
        266          UC   0.229   0.309
        267          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
        268          UA     100
                     *

        269          KK  CO240B COMBINE
        270          HC       2
                     *

        271          KK  RO260A   ROUTE
        272          RS       1    FLOW
        273          RC   0.050   0.035   0.050     225  0.0360    0.00
        274          RX    0.00    7.00   15.00   26.00   29.00   34.00   42.00   50.00
        275          RY    2.00    1.00    0.00    0.00    1.00    1.00    0.50    1.00
                     *

        276          KK   ON245   BASIN
        277          BA   0.003
        278          LG    0.35    0.40    6.00    0.18       0
        279          UC   0.191   0.296
        280          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
        281          UA     100
                     *

        282          KK  RO260B   ROUTE
        283          RS       1    FLOW
        284          RC   0.050   0.035   0.050     361  0.0280    0.00
        285          RX    0.00   23.00   44.00   69.00   70.00   85.00   92.00  104.00
        286          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                     *
```

```
289          LG    0.35    0.40    6.00    0.18       0
290          UC   0.176   0.215
291          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0.
292          UA     100
             *
1                                        HEC-1 INPUT                                        PAGE  9

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


293          KK   CO260 COMBINE
294          HC       3
             *

295          KK  RO200A   ROUTE
296          RS       1    FLOW
297          RC   0.050   0.035   0.050     611  0.0360    0.00
298          RX    0.00    5.00   12.00   45.00   61.00   68.00   73.00   78.00
299          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

300          KK   ON265   BASIN
301          BA   0.002
302          LG    0.35    0.40    6.00    0.18       0
303          UC   0.169   0.259
304          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
305          UA     100
             *

306          KK  RO200B   ROUTE
307          RS       1    FLOW
308          RC   0.050   0.035   0.050     345  0.0290    0.00
309          RX    0.00    6.00   12.00   20.00   21.00   41.00   47.00   51.00
310          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

311          KK   ON200   BASIN
312          BA   0.007
313          LG    0.35    0.40    6.00    0.18       0
314          UC   0.205   0.236
315          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
316          UA     100
             *

317          KK   ON270   BASIN
318          BA   0.002
319          LG    0.35    0.40    6.00    0.18       0
320          UC   0.160   0.222
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   CO200 COMBINE
324          HC       4
             *

325          KK   RO205   ROUTE
326          RS       1    FLOW
327          RC   0.050   0.035   0.050    1565  0.0370    0.00
328          RX    0.00    6.00   10.00   15.00   48.00   58.00   64.00   77.00
329          RY    4.00    2.00    1.00    0.00    0.00    1.00    2.00    4.00
             *
1                                        HEC-1 INPUT                                        PAGE 10

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


330          KK   ON205   BASIN
331          BA   0.019
332          LG    0.35    0.40    6.00    0.18       0
333          UC   0.310   0.398
334          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
335          UA     100
             *

336          KK   ON280   BASIN
337          BA   0.001
```

```
340          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
341          UA     100
             *

342          KK   RO210   ROUTE
343          RS       1    FLOW
344          RC   0.050   0.035   0.050    1804  0.0380    0.00
345          RX    0.00    2.00    4.00    5.00   10.00   12.00   14.00   18.00
346          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

347          KK   ON210   BASIN
348          BA   0.017
349          LG    0.35    0.40    6.00    0.18       0
350          UC   0.335   0.495
351          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
352          UA     100
             *

353          KK   CO205 COMBINE
354          HC       4
             *
355          ZZ
```

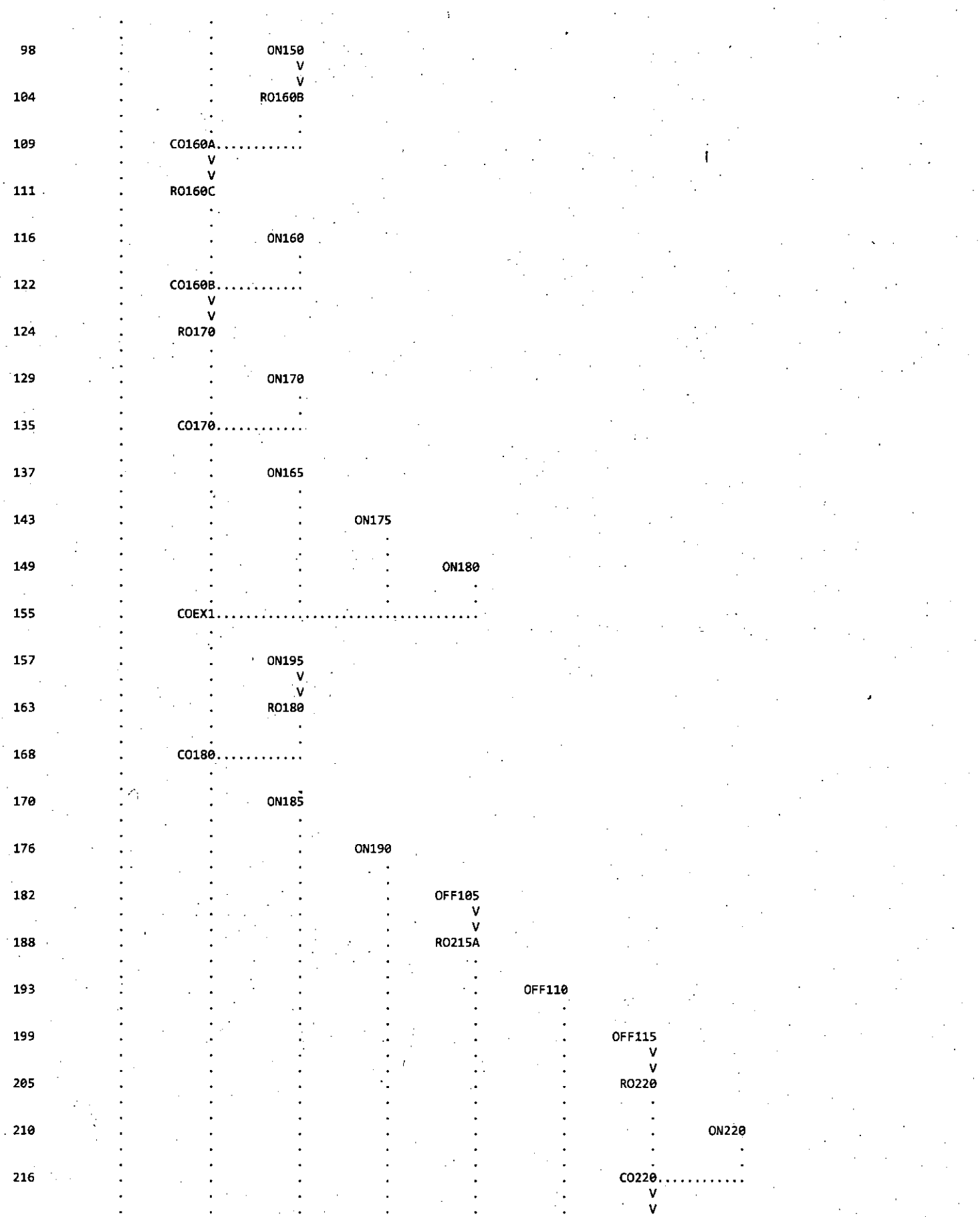
1

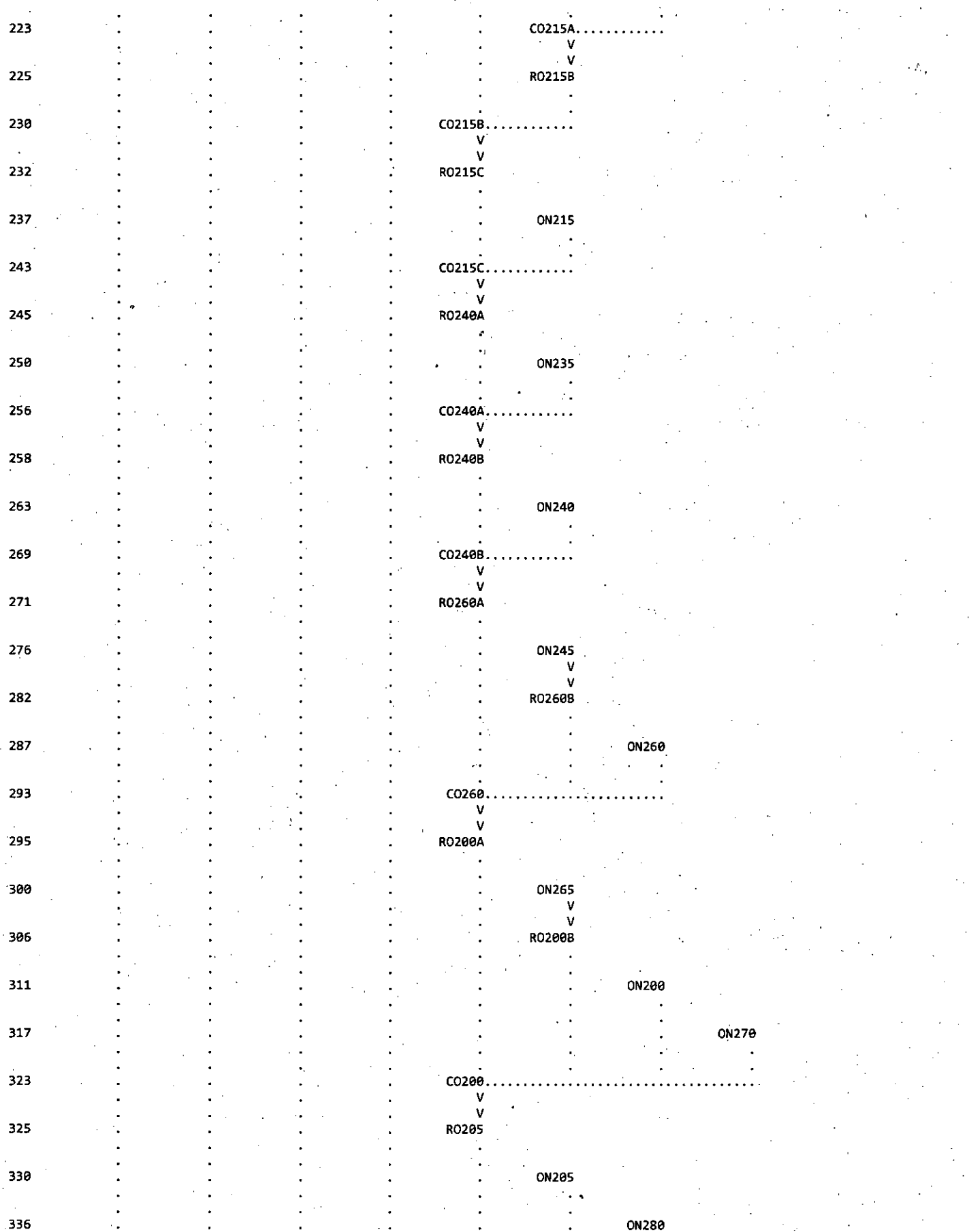
SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   19       OFF95
              V
              V
   25      RO140A
              .
              .
   30          .       OFF100
               .          V
               .          V
   36          .       RO140B
               .          .
               .          .
   41      CO140A.............
              V
              V
   43      RO140C
              .
              .
   48          .        ON140
               .          .
               .          .
   54      CO140B.............
              V
              V
   56      RO155B
              .
              .
   61          .        ON135
               .          V
               .          V
   67          .       RO155A
               .          .
               .          .
   72      CO155A.............
              V
              V
   74      RO155C
              .
              .
   79          .        ON155
               .          .
               .          .
   85      CO155B.............
              .
              .
   87          .        ON145
               .          V
```


98
ON150
104
RO160B
109
CO160A
111
RO160C
116
ON160
122
CO160B
124
RO170
129
ON170
135
CO170
137
ON165
143
ON175
149
ON180
155
COEX1
157
ON195
163
RO180
168
CO180
170
ON185
176
ON190
182
OFF105
188
RO215A
193
OFF110
199
OFF115
205
RO220
210
ON220
216
CO220


223
CO215A
V
V
225
RO215B
230
CO215B
V
V
232
RO215C
237
ON215
243
CO215C
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V
245
RO240A
250
ON235
256
CO240A
V
V
258
RO240B
263
ON240
269
CO240B
V
V
271
RO260A
276
ON245
V
V
282
RO260B
287
ON260
293
CO260
V
V
295
RO200A
300
ON265
V
V
306
RO200B
311
ON200
317
ON270
323
CO200
V
V
325
RO205
330
ON205
336
ON280

```
342      .      .      .      .      .      .      RO210
         .      .      .      .      .      .      .
347      .      .      .      .      .      .      .      ON210
         .      .      .      .      .      .      .      .
353      .      .      .      .      CO205...............................

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

```
1*****************************************                    *****************************************
*                                        *                    *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                    *   U.S. ARMY CORPS OF ENGINEERS        *
*             JUN   1998                 *                    *   HYDROLOGIC ENGINEERING CENTER       *
*           VERSION 4.1                  *                    *        609 SECOND STREET              *
*                                        *                    *     DAVIS, CALIFORNIA 95616           *
* RUN DATE   27OCT16  TIME  18:23:22     *                    *         (916) 756-1104                *
*                                        *                    *                                       *
******************************************                    *****************************************
```

```
                    Flood Control District of Maricopa County
                    STORYROCK PH1C EX - STORYROCK PHASE 1C 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	0.01	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								

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	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		
+	ROUTED TO	RO155B	49.	4.42	7.	2.	1.	0.09		
+	HYDROGRAPH AT	ON135	7.	4.17	1.	0.	0.	0.01		
+	ROUTED TO	RO155A	7.	4.17	1.	0.	0.	0.01		
+	2 COMBINED AT	CO155A	52.	4.42	8.	2.	1.	0.10		
+	ROUTED TO	RO155C	52.	4.42	8.	2.	1.	0.10		
+	HYDROGRAPH AT	ON155	13.	4.17	1.	0.	0.	0.02		
+	2 COMBINED AT	CO155B	61.	4.42	9.	2.	1.	0.12		
+	HYDROGRAPH AT	ON145	9.	4.25	1.	0.	0.	0.01		
+	ROUTED TO	RO160A	9.	4.25	1.	0.	0.	0.01		
+	HYDROGRAPH AT	ON150	7.	4.17	1.	0.	0.	0.01		
+	ROUTED TO	RO160B	6.	4.17	1.	0.	0.	0.01		
+	2 COMBINED AT	CO160A	15.	4.25	2.	0.	0.	0.02		
+	ROUTED TO	RO160C	12.	4.33	2.	0.	0.	0.02		

	2 COMBINED AT						
+		CO160B	32.	4.33	4.	1.	0.	0.06
	ROUTED TO						
+		RO170	31.	4.33	4.	1.	0.	0.06
	HYDROGRAPH AT						
+		ON170	6.	4.08	0.	0.	0.	0.01
	2 COMBINED AT						
+		CO170	34.	4.33	5.	1.	0.	0.06
	HYDROGRAPH AT						
+		ON165	6.	4.17	1.	0.	0.	0.01
	HYDROGRAPH AT						
+		ON175	5.	4.17	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		ON180	13.	4.25	2.	0.	0.	0.02
	4 COMBINED AT						
+		COEX1	54.	4.33	8.	2.	1.	0.10
	HYDROGRAPH AT						
+		ON195	7.	4.17	1.	0.	0.	0.01
	ROUTED TO						
+		RO180	5.	4.33	1.	0.	0.	0.01
	2 COMBINED AT						
+		CO180	59.	4.33	9.	2.	1.	0.11
	HYDROGRAPH AT						
+		ON185	2.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		ON190	9.	4.25	1.	0.	0.	0.01
	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						

	2 COMBINED AT							
+		CO215C	93.	4.33	13.	3.	1.	0.16
	ROUTED TO							
+		RO240A	93.	4.33	13.	3.	1.	0.16
	HYDROGRAPH AT							
+		ON235	2.	4.08	0.	0.	0.	0.00
	2 COMBINED AT							
+		CO240A	94.	4.33	13.	3.	1.	0.16
	ROUTED TO							
+		RO240B	94.	4.33	13.	3.	1.	0.16
	HYDROGRAPH AT							
+		ON240	6.	4.17	1.	0.	0.	0.01
	2 COMBINED AT							
+		CO240B	97.	4.33	13.	3.	1.	0.17
	ROUTED TO							
+		RO260A	97.	4.33	13.	3.	1.	0.17
	HYDROGRAPH AT							
+		ON245	3.	4.08	0.	0.	0.	0.00
	ROUTED TO							
+		RO260B	3.	4.17	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON260	3.	4.08	0.	0.	0.	0.00
	3 COMBINED AT							
+		CO260	100.	4.33	14.	3.	1.	0.18
	ROUTED TO							
+		RO200A	99.	4.42	14.	3.	1.	0.18
	HYDROGRAPH AT							
+		ON265	2.	4.08	0.	0.	0.	0.00
	ROUTED TO							
+		RO200B	2.	4.17	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON200	7.	4.08	1.	0.	0.	0.01
	HYDROGRAPH AT							
+		ON270	2.	4.08	0.	0.	0.	0.00
	4 COMBINED AT							
+		CO200	104.	4.33	15.	4.	1.	0.19
	ROUTED TO							
+		RO205	102.	4.42	15.	4.	1.	0.19
	HYDROGRAPH AT							
+		ON205	14.	4.25	1.	0.	0.	0.02
	HYDROGRAPH AT							
+		ON280	1.	4.00	0.	0.	0.	0.00
	ROUTED TO							
+		RO210	1.	4.17	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON210	11.	4.25	1.	0.	0.	0.02
	4 COMBINED AT							
+		CO205	120.	4.42	17.	4.	1.	0.23

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   27OCT16  TIME  18:23:25   *
*                                       *
*****************************************
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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
```

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 PH1C EX - STORYROCK PHASE 1C EXISTING CONDITION
  3           ID        100 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   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           KK   OFF95   BASIN
 20           BA   0.064
 21           LG    0.35    0.40    6.00    0.18       0
 22           UC   0.341   0.422
 23           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 24           UA     100
              *

 25           KK  RO140A   ROUTE
 26           RS       1    FLOW
 27           RC   0.050   0.035   0.050     333  0.0270    0.00
 28           RX    0.00   27.00   30.00   34.00   34.20   40.00   47.00   82.00
 29           RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

 30           KK  OFF100   BASIN
 31           BA   0.011
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          34          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          35          UA     100
                      *

          36          KK  RO140B   ROUTE
          37          RS       1    FLOW
          38          RC   0.050   0.035   0.050     626  0.0340    0.00
          39          RX    0.00    7.00    8.00   11.00   11.20   14.00   16.00   31.00
          40          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                      *
1                                        HEC-1 INPUT                                        PAGE  2

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

          41          KK  CO140A COMBINE
          42          HC       2
                      *

          43          KK  RO140C   ROUTE
          44          RS       1    FLOW
          45          RC   0.050   0.035   0.050    1210  0.0320    0.00
          46          RX    0.00    3.00    6.00   11.00   11.20   17.00   23.00   48.00
          47          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                      *

          48          KK   ON140   BASIN
          49          BA   0.017
          50          LG    0.35    0.40    6.00    0.18       0
          51          UC   0.255   0.366
          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  CO140B COMBINE
          55          HC       2
                      *

          56          KK  RO155B   ROUTE
          57          RS       1    FLOW
          58          RC   0.050   0.035   0.050     910  0.0350    0.00
          59          RX    0.00   16.00   61.00   76.00   90.00  121.00  200.00  226.00
          60          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                      *

          61          KK   ON135   BASIN
          62          BA   0.008
          63          LG    0.35    0.40    6.00    0.18       0
          64          UC   0.188   0.251
          65          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
          66          UA     100
                      *

          67          KK  RO155A   ROUTE
          68          RS       1    FLOW
          69          RC   0.050   0.035   0.050     805  0.2900    0.00
          70          RX    0.00    9.00   18.00   22.00   22.10   27.00   32.00   43.00
          71          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                      *

          72          KK  CO155A COMBINE
          73          HC       2
                      *
1                                        HEC-1 INPUT                                        PAGE  3

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

          74          KK  RO155C   ROUTE
          75          RS       1    FLOW
          76          RC   0.050   0.035   0.050     392  0.0330    0.00
          77          RX    0.00   14.00   22.00   30.00   42.00   54.00   68.00   98.00
          78          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                      *

          79          KK   ON155   BASIN
          80          BA   0.017
```

```
  83          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  84          UA     100
              *

  85          KK  CO155B COMBINE
  86          HC       2
              *

  87          KK   ON145   BASIN
  88          BA   0.014
  89          LG    0.35    0.40    6.00    0.18       0
  90          UC   0.236   0.341
  91          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  92          UA     100
              *

  93          KK  RO160A   ROUTE
  94          RS       1    FLOW
  95          RC   0.050   0.035   0.050     860  0.0300    0.00
  96          RX    0.00    9.00   16.00   19.00   19.10   22.00   25.00   32.00
  97          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

  98          KK   ON150   BASIN
  99          BA   0.007
 100          LG    0.35    0.40    6.00    0.18       0
 101          UC   0.166   0.196
 102          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 103          UA     100
              *

 104          KK  RO160B   ROUTE
 105          RS       1    FLOW
 106          RC   0.050   0.035   0.050    1090  0.0300    0.00
 107          RX    0.00    6.00   10.00   14.00   16.00   18.00   22.00   28.00
 108          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

 109          KK  CO160A COMBINE
 110          HC       2
              *

 111          KK  RO160C   ROUTE
 112          RS       1    FLOW
 113          RC   0.050   0.035   0.050    1952  0.0300    0.00
 114          RX    0.00   12.00   20.00   29.00   36.00   40.00   50.00   54.00
 115          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

 116          KK   ON160   BASIN
 117          BA   0.037
 118          LG    0.35    0.40    6.00    0.18       0
 119          UC   0.325   0.468
 120          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 121          UA     100
              *

 122          KK  CO160B COMBINE
 123          HC       2
              *

 124          KK   RO170   ROUTE
 125          RS       1    FLOW
 126          RC   0.050   0.035   0.050     585  0.0310    0.00
 127          RX    0.00    1.00    3.00    4.00   10.00   11.00   15.00   20.00
 128          RY    2.00    2.00    2.00    0.00    0.00    2.00    2.00    2.00
              *

 129          KK   ON170   BASIN
 130          BA   0.006
 131          LG    0.35    0.40    6.00    0.18       0
 132          UC   0.161   0.187
 133          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
```

```
 135          KK   CO170 COMBINE
 136          HC       2
              *

 137          KK   ON165   BASIN
 138          BA   0.008
 139          LG    0.35    0.40    6.00    0.18       0
 140          UC   0.195   0.282
 141          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 142          UA     100
              *
1                                        HEC-1 INPUT                                        PAGE  5

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

 143          KK   ON175   BASIN
 144          BA   0.005
 145          LG    0.35    0.40    6.00    0.18       0
 146          UC   0.161   0.218
 147          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 148          UA     100
              *

 149          KK   ON180   BASIN
 150          BA   0.024
 151          LG    0.35    0.40    6.00    0.18       0
 152          UC   0.289   0.450
 153          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 154          UA     100
              *

 155          KK   COEX1 COMBINE
 156          HC       4
              *

 157          KK   ON195   BASIN
 158          BA   0.009
 159          LG    0.35    0.40    6.00    0.18       0
 160          UC   0.204   0.287
 161          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 162          UA     100
              *

 163          KK   RO180   ROUTE
 164          RS       1    FLOW
 165          RC   0.050   0.035   0.050    2300  0.0340    0.00
 166          RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
 167          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
              *

 168          KK   CO180 COMBINE
 169          HC       2
              *

 170          KK   ON185   BASIN
 171          BA   0.002
 172          LG    0.35    0.40    6.00    0.18       0
 173          UC   0.113   0.135
 174          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 175          UA     100
              *

 176          KK   ON190   BASIN
 177          BA   0.013
 178          LG    0.35    0.40    6.00    0.18       0
 179          UC   0.231   0.348
 180          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 181          UA     100
              *
1                                        HEC-1 INPUT                                        PAGE  6

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

 182          KK  OFF105   BASIN
```

```
185          UC   0.336   0.402
186          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
187          UA     100
             *

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

193          KK  OFF110   BASIN
194          BA   0.037
195          LG    0.35    0.40    6.00    0.18       0
196          UC   0.268   0.353
197          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
198          UA     100
             *

199          KK  OFF115   BASIN
200          BA   0.007
201          LG    0.35    0.40    6.00    0.18       0
202          UC   0.142   0.140
203          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
204          UA     100
             *

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

210          KK   ON220   BASIN
211          BA   0.003
212          LG    0.35    0.40    6.00    0.18       0
213          UC   0.139   0.194
214          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
215          UA     100
             *

216          KK   CO220 COMBINE
217          HC       2
             *
```



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

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

223          KK  CO215A COMBINE
224          HC       2
             *

225          KK  RO215B   ROUTE
226          RS       1    FLOW
227          RC   0.050   0.035   0.050     800  0.0340    0.00
228          RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
229          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

230          KK  CO215B COMBINE
231          HC       2
             *

232          KK  RO215C   ROUTE
233          RS       1    FLOW
234          RC   0.050   0.035   0.050     445  0.0340    0.00
235          RX    0.00   12.00   28.00   36.00   48.00   71.00   73.00   76.00
```

```
237          KK   ON215   BASIN
238          BA   0.030
239          LG    0.35    0.40    6.00    0.18       0
240          UC   0.218   0.202
241          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
242          UA     100
             *

243          KK  CO215C COMBINE
244          HC       2
             *

245          KK  RO240A   ROUTE
246          RS       1    FLOW
247          RC   0.050   0.035   0.050     245  0.0370    0.00
248          RX    0.00    5.00   10.00   14.00   32.00   41.00   48.00   52.00
249          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

250          KK   ON235   BASIN
251          BA   0.002
252          LG    0.35    0.40    6.00    0.18       0
253          UC   0.110   0.132
254          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
255          UA     100
             *

1                                        HEC-1 INPUT                                    PAGE  8

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

256          KK  CO240A COMBINE
257          HC       2
             *

258          KK  RO240B   ROUTE
259          RS       1    FLOW
260          RC   0.050   0.035   0.050     465  0.0390    0.00
261          RX    0.00    7.00   19.00   49.00   65.00   70.00   77.00   85.00
262          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

263          KK   ON240   BASIN
264          BA   0.007
265          LG    0.35    0.40    6.00    0.18       0
266          UC   0.172   0.225
267          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
268          UA     100
             *

269          KK  CO240B COMBINE
270          HC       2
             *

271          KK  RO260A   ROUTE
272          RS       1    FLOW
273          RC   0.050   0.035   0.050     225  0.0360    0.00
274          RX    0.00    7.00   15.00   26.00   29.00   34.00   42.00   50.00
275          RY    2.00    1.00    0.00    0.00    1.00    1.00    0.50    1.00
             *

276          KK   ON245   BASIN
277          BA   0.003
278          LG    0.35    0.40    6.00    0.18       0
279          UC   0.143   0.216
280          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
281          UA     100
             *

282          KK  RO260B   ROUTE
283          RS       1    FLOW
284          RC   0.050   0.035   0.050     361  0.0280    0.00
285          RX    0.00   23.00   44.00   69.00   70.00   85.00   92.00  104.00
286          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
```

```
289          LG    0.35    0.40    6.00    0.18       0
290          UC   0.133   0.157
291          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
292          UA     100
             *
1                                        HEC-1 INPUT                                        PAGE  9

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


293          KK   CO260 COMBINE
294          HC       3
             *

295          KK  RO200A   ROUTE
296          RS       1    FLOW
297          RC   0.050   0.035   0.050     611  0.0360    0.00
298          RX    0.00    5.00   12.00   45.00   61.00   68.00   73.00   78.00
299          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

300          KK   ON265   BASIN
301          BA   0.002
302          LG    0.35    0.40    6.00    0.18       0
303          UC   0.127   0.189
304          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
305          UA     100
             *

306          KK  RO200B   ROUTE
307          RS       1    FLOW
308          RC   0.050   0.035   0.050     345  0.0290    0.00
309          RX    0.00    6.00   12.00   20.00   21.00   41.00   47.00   51.00
310          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

311          KK   ON200   BASIN
312          BA   0.007
313          LG    0.35    0.40    6.00    0.18       0
314          UC   0.154   0.172
315          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
316          UA     100
             *

317          KK   ON270   BASIN
318          BA   0.002
319          LG    0.35    0.40    6.00    0.18       0
320          UC   0.121   0.162
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   CO200 COMBINE
324          HC       4
             *

325          KK   RO205   ROUTE
326          RS       1    FLOW
327          RC   0.050   0.035   0.050    1565  0.0370    0.00
328          RX    0.00    6.00   10.00   15.00   48.00   58.00   64.00   77.00
329          RY    4.00    2.00    1.00    0.00    0.00    1.00    2.00    4.00
             *
1                                        HEC-1 INPUT                                        PAGE 10

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


330          KK   ON205   BASIN
331          BA   0.019
332          LG    0.35    0.40    6.00    0.18       0
333          UC   0.233   0.290
334          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
335          UA     100
             *

336          KK   ON280   BASIN
337          BA   0.001
```

```
340          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
341          UA     100
                    *

342          KK   RO210   ROUTE
343          RS       1    FLOW
344          RC   0.050   0.035   0.050    1804  0.0380    0.00
345          RX    0.00    2.00    4.00    5.00   10.00   12.00   14.00   18.00
346          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                    *

347          KK   ON210   BASIN
348          BA   0.017
349          LG    0.35    0.40    6.00    0.18       0
350          UC   0.252   0.361
351          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
352          UA     100
                    *

353          KK   CO205 COMBINE
354          HC       4
                    *
355          ZZ
```

1

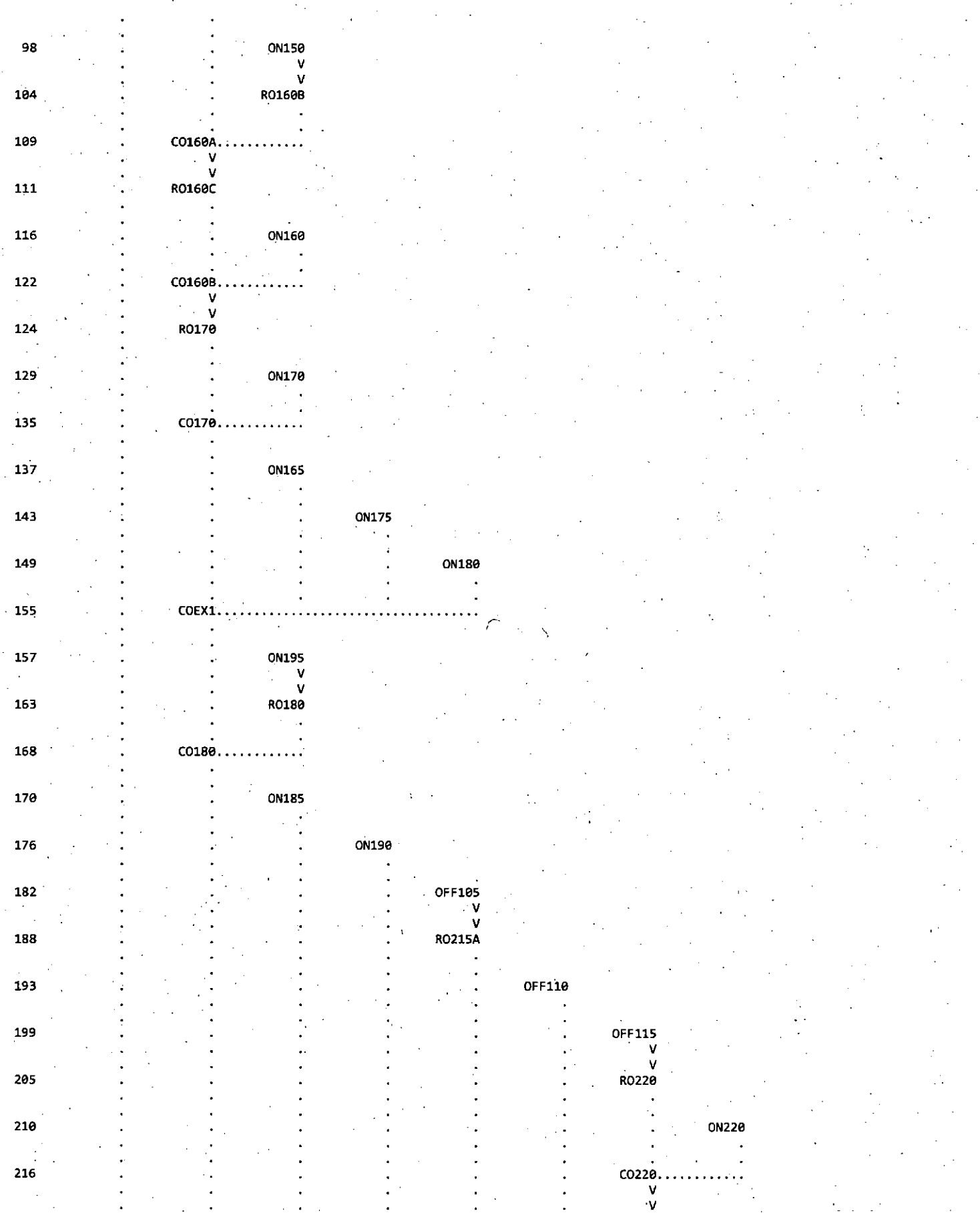
SCHEMATIC DIAGRAM OF STREAM NETWORK

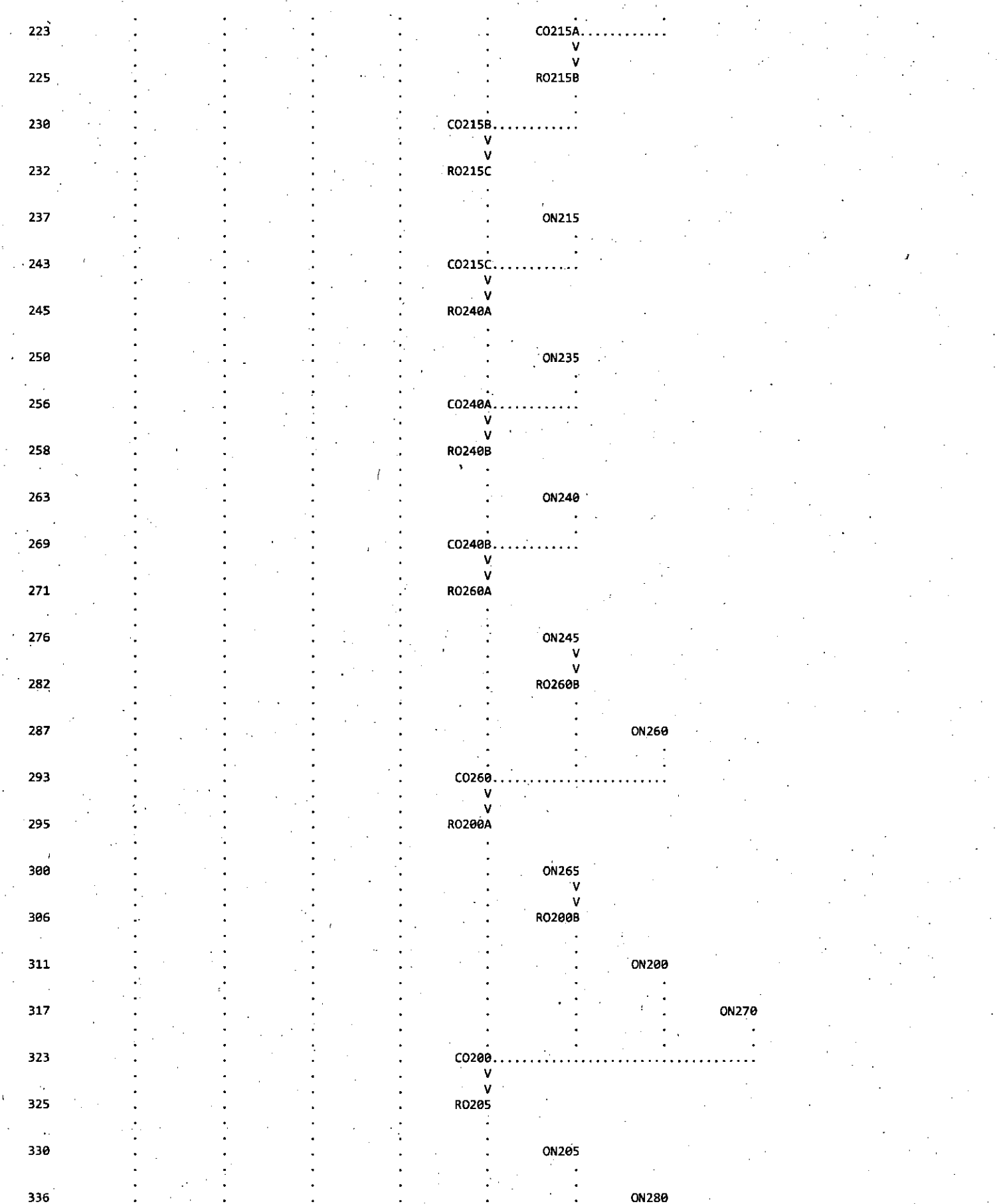
INPUT LINE NO.

(V) ROUTING (---->) DIVERSION OR PUMP FLOW .

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW

```
 19      OFF95
             V
             V
 25      RO140A
             .
             .
 30          .       OFF100
             .           V
             .           V
 36          .       RO140B
             .           .
             .           .
 41      CO140A.............
             V
             V
 43      RO140C
             .
             .
 48          .        ON140
             .           .
             .           .
 54      CO140B.............
             V
             V
 56      RO155B
             .
             .
 61          .        ON135
             .           V
             .           V
 67          .       RO155A
             .           .
             .           .
 72      CO155A.............
             V
             V
 74      RO155C
             .
             .
 79          .        ON155
             .           .
             .           .
 85      CO155B.............
             .
             .
 87          .        ON145
             .           V
```


98
ON150
104
RO160B
109
CO160A
111
RO160C
116
ON160
122
CO160B
124
RO170
129
ON170
135
CO170
137
ON165
143
ON175
149
ON180
155
COEX1
157
ON195
163
RO180
168
CO180
170
ON185
176
ON190
182
OFF105
188
RO215A
193
OFF110
199
OFF115
205
RO220
210
ON220
216
CO220


223
CO215A
225
RO215B
230
CO215B
232
RO215C
237
ON215
243
CO215C
245
RO240A
250
ON235
256
CO240A
258
RO240B
263
ON240
269
CO240B
271
RO260A
276
ON245
282
RO260B
287
ON260
293
CO260
295
RO200A
300
ON265
306
RO200B
311
ON200
317
ON270
323
CO200
325
RO205
330
ON205
336
ON280

```
342      .        .        .        .        .        .        RO210
         .        .        .        .        .        .        .
347      .        .        .        .        .        .        .        ON210
         .        .        .        .        .        .        .        .
353      .        .        .        .     CO205.................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                    *****************************************
*                                        *                                    *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                                    *   U.S. ARMY CORPS OF ENGINEERS        *
*            JUN   1998                  *                                    *   HYDROLOGIC ENGINEERING CENTER       *
*          VERSION 4.1                   *                                    *         609 SECOND STREET             *
*                                        *                                    *     DAVIS, CALIFORNIA 95616           *
* RUN DATE   27OCT16  TIME  18:23:25     *                                    *         (916) 756-1104                *
*                                        *                                    *                                       *
*****************************************                                    *****************************************


                              Flood Control District of Maricopa County
                              STORYROCK PH1C EX - STORYROCK PHASE 1C 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	0.01	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								

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	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		
+	ROUTED TO	RO155B	124.	4.33	15.	4.	1.	0.09		
+	HYDROGRAPH AT	ON135	16.	4.08	1.	0.	0.	0.01		
+	ROUTED TO	RO155A	15.	4.17	1.	0.	0.	0.01		
+	2 COMBINED AT	CO155A	133.	4.33	17.	4.	1.	0.10		
+	ROUTED TO	RO155C	134.	4.33	17.	4.	1.	0.10		
+	HYDROGRAPH AT	ON155	31.	4.17	3.	1.	0.	0.02		
+	2 COMBINED AT	CO155B	153.	4.25	19.	5.	2.	0.12		
+	HYDROGRAPH AT	ON145	23.	4.17	2.	1.	0.	0.01		
+	ROUTED TO	RO160A	22.	4.17	2.	1.	0.	0.01		
+	HYDROGRAPH AT	ON150	16.	4.08	1.	0.	0.	0.01		
+	ROUTED TO	RO160B	14.	4.17	1.	0.	0.	0.01		
+	2 COMBINED AT	CO160A	37.	4.17	4.	1.	0.	0.02		
+	ROUTED TO	RO160C	33.	4.25	4.	1.	0.	0.02		

+	2 COMBINED AT	CO160B	81.	4.25	10.	2.	1.	0.06
+	ROUTED TO	RO170	81.	4.25	10.	2.	1.	0.06
+	HYDROGRAPH AT	ON170	14.	4.08	1.	0.	0.	0.01
+	2 COMBINED AT	CO170	89.	4.25	11.	3.	1.	0.06
+	HYDROGRAPH AT	ON165	15.	4.08	1.	0.	0.	0.01
+	HYDROGRAPH AT	ON175	11.	4.08	1.	0.	0.	0.00
+	HYDROGRAPH AT	ON180	32.	4.17	4.	1.	0.	0.02
+	4 COMBINED AT	COEX1	139.	4.17	17.	4.	1.	0.10
+	HYDROGRAPH AT	ON195	16.	4.08	2.	0.	0.	0.01
+	ROUTED TO	RO180	13.	4.25	2.	0.	0.	0.01
+	2 COMBINED AT	CO180	152.	4.25	18.	5.	2.	0.11
+	HYDROGRAPH AT	ON185	5.	4.00	0.	0.	0.	0.00
+	HYDROGRAPH AT	ON190	21.	4.17	2.	1.	0.	0.01
+	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							

	2 COMBINED AT							
+		CO215C	233.	4.25	27.	7.	2.	0.16
	ROUTED TO							
+		RO240A	233.	4.25	27.	7.	2.	0.16
	HYDROGRAPH AT							
+		ON235	5.	4.00	0.	0.	0.	0.00
	2 COMBINED AT							
+		CO240A	235.	4.25	27.	7.	2.	0.16
	ROUTED TO							
+		RO240B	236.	4.25	27.	7.	2.	0.16
	HYDROGRAPH AT							
+		ON240	15.	4.08	1.	0.	0.	0.01
	2 COMBINED AT							
+		CO240B	245.	4.25	28.	7.	2.	0.17
	ROUTED TO							
+		RO260A	244.	4.25	28.	7.	2.	0.17
	HYDROGRAPH AT							
+		ON245	6.	4.08	1.	0.	0.	0.00
	ROUTED TO							
+		RO260B	6.	4.08	1.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON260	7.	4.08	1.	0.	0.	0.00
	3 COMBINED AT							
+		CO260	251.	4.25	29.	7.	2.	0.18
	ROUTED TO							
+		RO200A	252.	4.25	29.	7.	2.	0.18
	HYDROGRAPH AT							
+		ON265	4.	4.08	0.	0.	0.	0.00
	ROUTED TO							
+		RO200B	4.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON200	16.	4.08	1.	0.	0.	0.01
	HYDROGRAPH AT							
+		ON270	5.	4.00	0.	0.	0.	0.00
	4 COMBINED AT							
+		CO200	265.	4.25	31.	8.	3.	0.19
	ROUTED TO							
+		RO205	257.	4.33	31.	8.	3.	0.19
	HYDROGRAPH AT							
+		ON205	33.	4.17	3.	1.	0.	0.02
	HYDROGRAPH AT							
+		ON280	3.	4.00	0.	0.	0.	0.00
	ROUTED TO							
+		RO210	2.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON210	27.	4.17	3.	1.	0.	0.02
	4 COMBINED AT							
+		CO205	307.	4.25	37.	9.	3.	0.23

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

Proposed Condition

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: STORYROCK PH1C 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																		
OFF95	0.064	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)	0.711	0.657	0.579	0.502	0.457	0.422
OFF100	0.011	0.23	253.3	241.8	NATURAL	0.068	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.310	0.289*	0.258*	0.227*	0.208*	0.194 *
												Vel (f/s)	1.09	1.17	1.31	1.49	1.62	1.74
												R (Hrs)	0.407	0.376	0.331	0.288	0.262	0.241
OFF105	0.085	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)	0.678	0.627	0.552	0.479	0.436	0.402
OFF110	0.037	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)	0.595	0.550	0.484	0.420	0.382	0.353
OFF115	0.007	0.13	375.0	283.6	NATURAL	0.071	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.227*	0.211*	0.189*	0.166*	0.152*	0.142 *
												Vel (f/s)	0.84	0.90	1.01	1.15	1.25	1.34
												R (Hrs)	0.236	0.218	0.192	0.167	0.152	0.140
ON135	0.008	0.20	225.6	222.8	NATURAL	0.070	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.301	0.281*	0.250*	0.220*	0.202*	0.188 *
												Vel (f/s)	0.97	1.04	1.17	1.33	1.45	1.56
												R (Hrs)	0.422	0.391	0.344	0.298	0.272	0.251
ON140	0.017	0.36	195.6	195.6	NATURAL	0.064	0.34	0.39	6.00	0.180	4	**Tc (Hrs)**	0.391	0.366	0.328	0.290*	0.267*	0.249 *
												Vel (f/s)	1.35	1.44	1.61	1.82	1.98	2.12
												R (Hrs)	0.588	0.546	0.483	0.422	0.385	0.356
ON145	0.014	0.32	214.3	213.3	NATURAL	0.062	0.31	0.38	6.00	0.188	9	**Tc (Hrs)**	0.341	0.321	0.290*	0.258*	0.238*	0.223 *
												Vel (f/s)	1.38	1.46	1.62	1.82	1.97	2.10
												R (Hrs)	0.514	0.481	0.428	0.376	0.345	0.320
ON150	0.007	0.16	250.0	239.9	NATURAL	0.071	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.265*	0.247*	0.220*	0.194*	0.178*	0.166 *
												Vel (f/s)	0.89	0.95	1.07	1.21	1.32	1.41
												R (Hrs)	0.331	0.306	0.270	0.234	0.213	0.196

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: STORYROCK PH1C 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																		
ON155	0.017	0.28	191.3	191.3	NATURAL	0.052	0.33	0.34	6.00	0.192	11	**Tc (Hrs)**	0.297*	0.280*	0.253*	0.225*	0.208*	0.195 *
												Vel (f/s)	1.38	1.47	1.62	1.83	1.97	2.11
												R (Hrs)	0.354	0.332	0.296	0.261	0.239	0.222
ON160	0.020	0.61	178.5	178.5	NATURAL	0.049	0.33	0.33	6.00	0.197	14	**Tc (Hrs)**	0.428	0.404	0.366	0.327	0.303	0.284 *
												Vel (f/s)	2.09	2.21	2.44	2.74	2.95	3.15
												R (Hrs)	0.904	0.848	0.760	0.670	0.616	0.573
ON161	0.010	0.32	224.7	222.1	NATURAL	0.063	0.34	0.37	6.00	0.183	5	**Tc (Hrs)**	0.348	0.326	0.293*	0.259*	0.239*	0.223 *
												Vel (f/s)	1.35	1.44	1.60	1.81	1.96	2.10
												R (Hrs)	0.636	0.592	0.525	0.458	0.419	0.388
ON165	0.008	0.35	183.4	183.4	NATURAL	0.040	0.31	0.27	6.00	0.212	24	**Tc (Hrs)**	0.274*	0.260*	0.237*	0.214*	0.199*	0.188 *
												Vel (f/s)	1.87	1.97	2.17	2.40	2.58	2.73
												R (Hrs)	0.594	0.562	0.508	0.451	0.418	0.391
ON170	0.005	0.14	204.4	204.2	NATURAL	0.073	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.265*	0.247*	0.220*	0.193*	0.178*	0.165 *
												Vel (f/s)	0.77	0.83	0.93	1.06	1.15	1.24
												R (Hrs)	0.360	0.332	0.293	0.254	0.231	0.213
ON175	0.002	0.06	327.6	272.1	NATURAL	0.039	0.30	0.25	6.00	0.167	17	**Tc (Hrs)**	0.099*	0.094*	0.085*	0.076*	0.071*	0.067 *
												Vel (f/s)	0.89	0.94	1.04	1.16	1.24	1.31
												R (Hrs)	0.103	0.097	0.087	0.077	0.072	0.067
ON180	0.005	0.14	957.7	313.0	NATURAL	0.059	0.25	0.34	6.00	0.209	24	**Tc (Hrs)**	0.181*	0.172*	0.157*	0.141*	0.132*	0.124 *
												Vel (f/s)	1.13	1.19	1.31	1.46	1.56	1.66
												R (Hrs)	0.235	0.222	0.201	0.179	0.166	0.155
ON179	0.002	0.07	291.7	260.3	NATURAL	0.079	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.181*	0.168*	0.150*	0.132*	0.121*	0.113 *
												Vel (f/s)	0.57	0.61	0.68	0.78	0.85	0.91
												R (Hrs)	0.228	0.211	0.186	0.161	0.147	0.135
ON181	0.004	0.13	310.1	266.8	NATURAL	0.047	0.31	0.29	6.00	0.207	20	**Tc (Hrs)**	0.165*	0.156*	0.142*	0.128*	0.119*	0.112 *
												Vel (f/s)	1.16	1.22	1.34	1.49	1.60	1.70
												R (Hrs)	0.227	0.214	0.193	0.171	0.158	0.148

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: STORYROCK PH1C PROP

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj. Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
ON182	0.009	0.19	203.2	203.0	NATURAL	0.050	0.32	0.32	6.00	0.198	15	**Tc (Hrs)**	0.230*	0.217*	0.197*	0.176*	0.163*	0.153 *
												Vel (f/s)	1.21	1.28	1.41	1.58	1.71	1.82
												R (Hrs)	0.281	0.264	0.237	0.209	0.192	0.179
ON183	0.007	0.27	200.0	199.9	NATURAL	0.056	0.33	0.34	6.00	0.179	9	**Tc (Hrs)**	0.299*	0.282*	0.254*	0.226*	0.209*	0.196 *
												Vel (f/s)	1.32	1.40	1.56	1.75	1.89	2.02
												R (Hrs)	0.575	0.539	0.481	0.421	0.386	0.359
ON184	0.009	0.18	165.7	165.7	NATURAL	0.035	0.30	0.25	6.00	0.216	27	**Tc (Hrs)**	0.186*	0.177*	0.162*	0.146*	0.136*	0.129 *
												Vel (f/s)	1.42	1.49	1.63	1.81	1.94	2.05
												R (Hrs)	0.212	0.201	0.182	0.162	0.151	0.141
ON185	0.002	0.07	309.9	266.8	NATURAL	0.079	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.179*	0.167*	0.149*	0.131*	0.121*	0.112 *
												Vel (f/s)	0.57	0.61	0.69	0.78	0.85	0.92
												R (Hrs)	0.226	0.209	0.184	0.160	0.145	0.134
ON190	0.006	0.21	232.2	227.8	NATURAL	0.048	0.32	0.30	6.00	0.203	18	**Tc (Hrs)**	0.225*	0.213*	0.193*	0.173*	0.161*	0.151 *
												Vel (f/s)	1.37	1.45	1.60	1.78	1.91	2.04
												R (Hrs)	0.374	0.352	0.317	0.280	0.258	0.241
ON191	0.006	0.14	273.4	252.5	NATURAL	0.041	0.31	0.27	6.00	0.182	17	**Tc (Hrs)**	0.161*	0.153*	0.138*	0.124*	0.115*	0.109 *
												Vel (f/s)	1.28	1.34	1.49	1.66	1.79	1.88
												R (Hrs)	0.187	0.176	0.158	0.139	0.129	0.121
ON195	0.009	0.23	214.9	213.8	NATURAL	0.070	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.327	0.305	0.272*	0.239*	0.220*	0.204 *
												Vel (f/s)	1.03	1.11	1.24	1.41	1.53	1.65
												R (Hrs)	0.484	0.448	0.394	0.342	0.311	0.287
ON200	0.006	0.15	328.8	272.4	NATURAL	0.072	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.249*	0.232*	0.207*	0.182*	0.167*	0.155 *
												Vel (f/s)	0.88	0.95	1.06	1.21	1.32	1.42
												R (Hrs)	0.320	0.296	0.260	0.226	0.206	0.190
ON210	0.017	0.36	192.7	192.7	NATURAL	0.066	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.410	0.382	0.341	0.300	0.275*	0.256 *
												Vel (f/s)	1.29	1.38	1.55	1.76	1.92	2.06
												R (Hrs)	0.620	0.573	0.504	0.438	0.398	0.367

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: STORYROCK PH1C 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																		
ON205	0.020	0.33	224.9	222.2	NATURAL	0.062	0.35	0.39	6.00	0.179	2	**Tc (Hrs)**	0.359	0.335	0.299*	0.264*	0.243*	0.226 *
												Vel (f/s)	1.35	1.44	1.62	1.83	1.99	2.14
												R (Hrs)	0.454	0.421	0.372	0.323	0.295	0.272
ON215	0.030	0.32	251.6	240.8	NATURAL	0.062	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.349	0.325	0.290*	0.255*	0.235*	0.218 *
												Vel (f/s)	1.34	1.44	1.62	1.84	2.00	2.15
												R (Hrs)	0.341	0.316	0.278	0.241	0.219	0.202
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
ON235	0.002	0.07	369.9	282.5	NATURAL	0.079	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.176*	0.164*	0.146*	0.129*	0.118*	0.110 *
												Vel (f/s)	0.58	0.63	0.70	0.80	0.87	0.93
												R (Hrs)	0.222	0.205	0.181	0.157	0.143	0.132
ON240	0.007	0.18	280.2	255.6	NATURAL	0.071	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.276*	0.257*	0.229*	0.202*	0.185*	0.172 *
												Vel (f/s)	0.96	1.03	1.15	1.31	1.43	1.53
												R (Hrs)	0.380	0.351	0.309	0.269	0.244	0.225
ON245	0.003	0.12	317.1	269.0	NATURAL	0.076	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.230*	0.214*	0.191*	0.168*	0.154*	0.143 *
												Vel (f/s)	0.77	0.82	0.92	1.05	1.14	1.23
												R (Hrs)	0.363	0.336	0.296	0.257	0.234	0.216
ON260	0.003	0.09	219.8	218.0	NATURAL	0.076	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.212*	0.198*	0.176*	0.155*	0.143*	0.133 *
												Vel (f/s)	0.62	0.67	0.75	0.85	0.92	0.99
												R (Hrs)	0.265	0.245	0.215	0.187	0.170	0.157
ON265	0.002	0.09	311.1	267.1	NATURAL	0.079	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.203*	0.189*	0.169*	0.149*	0.137*	0.127 *
												Vel (f/s)	0.65	0.70	0.78	0.89	0.96	1.04
												R (Hrs)	0.318	0.294	0.259	0.225	0.204	0.189
ON270	0.002	0.08	292.7	260.7	NATURAL	0.079	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.193*	0.180*	0.160*	0.141*	0.130*	0.121 *
												Vel (f/s)	0.61	0.65	0.73	0.83	0.90	0.97
												R (Hrs)	0.273	0.253	0.222	0.193	0.176	0.162

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: STORYROCK PH1C 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																		
ON280	0.001	0.04	388.9	286.4	NATURAL	0.083	0.35	0.40	6.00	0.176		**Tc (Hrs)**	0.136*	0.127*	0.113*	0.100*	0.091*	0.085 *
												Vel (f/s)	0.43	0.46	0.52	0.59	0.64	0.69
												R (Hrs)	0.158	0.146	0.129	0.112	0.102	0.094

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: STORYROCK PH1C PROP

	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
100	DESERT	0.0107	100.0	0.35	0	25.0	DRY	0.068	Desert
		0.0107	**100.0**						
105	DESERT	0.0851	100.0	0.35	0	25.0	DRY	0.056	Desert
		0.0851	**100.0**						
110	DESERT	0.0369	100.0	0.35	0	25.0	DRY	0.061	Desert
		0.0369	**100.0**						
115	DESERT	0.0065	100.0	0.35	0	25.0	DRY	0.071	Desert
		0.0065	**100.0**						
95	DESERT	0.0642	100.0	0.35	0	25.0	DRY	0.058	Desert
		0.0642	**100.0**						
85	DESERT	0.0082	100.0	0.35	0	25.0	DRY	0.070	Desert
		0.0082	**100.0**						
40	DESERT	0.0160	94.1	0.35	0	25.0	DRY	0.066	Desert
	ROAD	0.0010	5.9	0.10	60	75.0	NORMAL	0.034	Local Roadway 40' Tract 24' BC
		0.0170	**100.0**						
45	DESERT	0.0120	85.7	0.35	0	25.0	DRY	0.067	Desert
	ROAD	0.0020	14.3	0.10	60	75.0	NORMAL	0.034	Local Roadway 40' Tract 24' BC
		0.0140	**100.0**						
50	DESERT	0.0067	100.0	0.35	0	25.0	DRY	0.071	Desert
		0.0067	**100.0**						
55	DESERT	0.0100	58.8	0.35	0	25.0	DRY	0.066	Desert

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: STORYROCK PH1C PROP

	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
	R1-18	0.0070	41.2	0.30	27	50.0	NORMAL	0.034	Residential 18,000 sq-ft lots
		0.0170	**100.0**						
0	DESERT	0.0100	50.0	0.35	0	25.0	DRY	0.065	Desert
	R1-18	0.0100	50.0	0.30	27	50.0	NORMAL	0.033	Residential 18,000 sq-ft lots
		0.0200	**100.0**						
1	DESERT	0.0090	81.8	0.35	0	25.0	DRY	0.069	Desert
	R1-18	0.0020	18.2	0.30	27	50.0	NORMAL	0.035	Residential 18,000 sq-ft lots
		0.0110	**100.0**						
5	DESERT	0.0010	12.5	0.35	0	25.0	DRY	0.070	Desert
	R1-18	0.0070	87.5	0.30	27	50.0	NORMAL	0.036	Residential 18,000 sq-ft lots
		0.0080	**100.0**						
0	DESERT	0.0050	100.0	0.35	0	25.0	DRY	0.073	Desert
		0.0050	**100.0**						
5	R1-43	0.0020	100.0	0.30	17	20.0	NORMAL	0.039	Residential 43,000 sq-ft lots
		0.0020	**100.0**						
9	DESERT	0.0020	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0020	**100.0**						
0	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**						

* Non default value

	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
r Basin ID: 01									
1	DESERT	0.0010	25.0	0.35	0	25.0	DRY	0.074	Desert
	R1-18	0.0030	75.0	0.30	27	50.0	NORMAL	0.037	Residential 18,000 sq-ft lots
		0.0040	**100.0**						
2	DESERT	0.0040	44.4	0.35	0	25.0	DRY	0.070	Desert
	R1-18	0.0050	55.6	0.30	27	50.0	NORMAL	0.035	Residential 18,000 sq-ft lots
		0.0090	**100.0**						
3	DESERT	0.0040	57.1	0.35	0	25.0	DRY	0.071	Desert
	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
		0.0070	**100.0**						
4	R1-18	0.0090	100.0	0.30	27	50.0	NORMAL	0.035	Residential 18,000 sq-ft lots
		0.0090	**100.0**						
5	DESERT	0.0010	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0010	**100.0**						
0	DESERT	0.0020	33.3	0.35	0	25.0	DRY	0.072	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**						
1	DESERT	0.0010	14.3	0.35	0	25.0	DRY	0.072	Desert
	R1-18	0.0020	28.6	0.30	27	50.0	NORMAL	0.036	Residential 18,000 sq-ft lots
	R1-43	0.0040	57.1	0.30	17	20.0	NORMAL	0.036	Residential 43,000 sq-ft lots

	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
		0.0070	**100.0**						
95	DESERT	0.0093	100.0	0.35	0	25.0	DRY	0.070	Desert
		0.0093	**100.0**						
00	DESERT	0.0060	100.0	0.35	0	25.0	DRY	0.072	Desert
		0.0060	**100.0**						
05	DESERT	0.0185	92.5	0.35	0	25.0	DRY	0.065	Desert
	R1-18	0.0015	7.5	0.30	27	50.0	NORMAL	0.033	Residential 18,000 sq-ft lots
		0.0200	**100.0**						
10	DESERT	0.0170	100.0	0.35	0	25.0	DRY	0.066	Desert
		0.0170	**100.0**						
15	DESERT	0.0302	100.0	0.35	0	25.0	DRY	0.062	Desert
		0.0302	**100.0**						
20	DESERT	0.0028	100.0	0.35	0	25.0	DRY	0.076	Desert
		0.0028	**100.0**						
35	DESERT	0.0024	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0024	**100.0**						
40	DESERT	0.0071	100.0	0.35	0	25.0	DRY	0.071	Desert
		0.0071	**100.0**						
45	DESERT	0.0033	100.0	0.35	0	25.0	DRY	0.076	Desert
		0.0033	**100.0**						
60	DESERT	0.0026	100.0	0.35	0	25.0	DRY	0.076	Desert

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: STORYROCK PH1C PROP

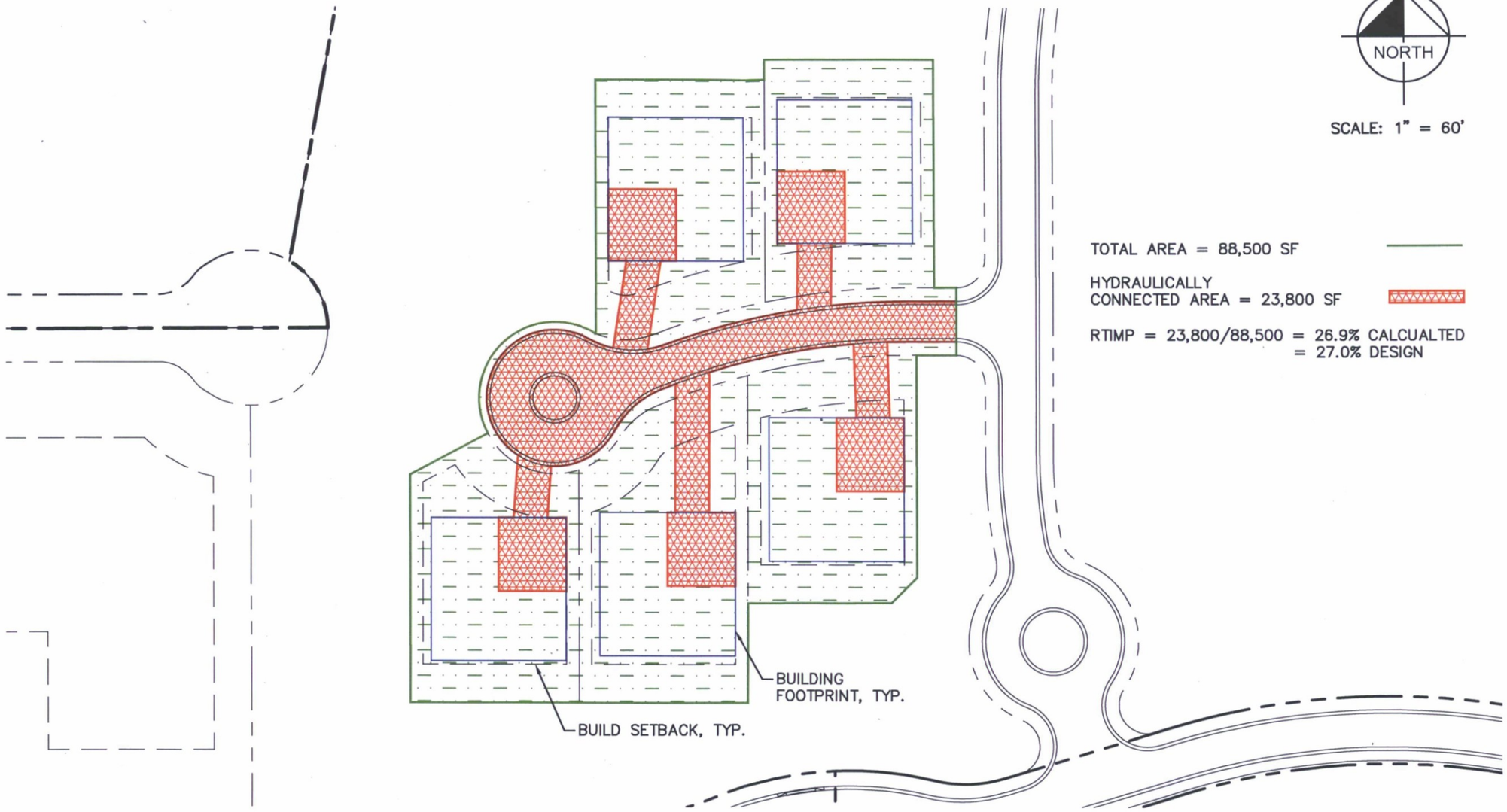
in	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
jor Basin ID: 01									
		0.0026	**100.0**						
265	DESERT	0.0018	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0018	**100.0**						
270	DESERT	0.0022	100.0	0.35	0	25.0	DRY	0.079	Desert
		0.0022	**100.0**						
280	DESERT	0.0010	100.0	0.35	0	25.0	DRY	0.083	Desert
		0.0010	**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

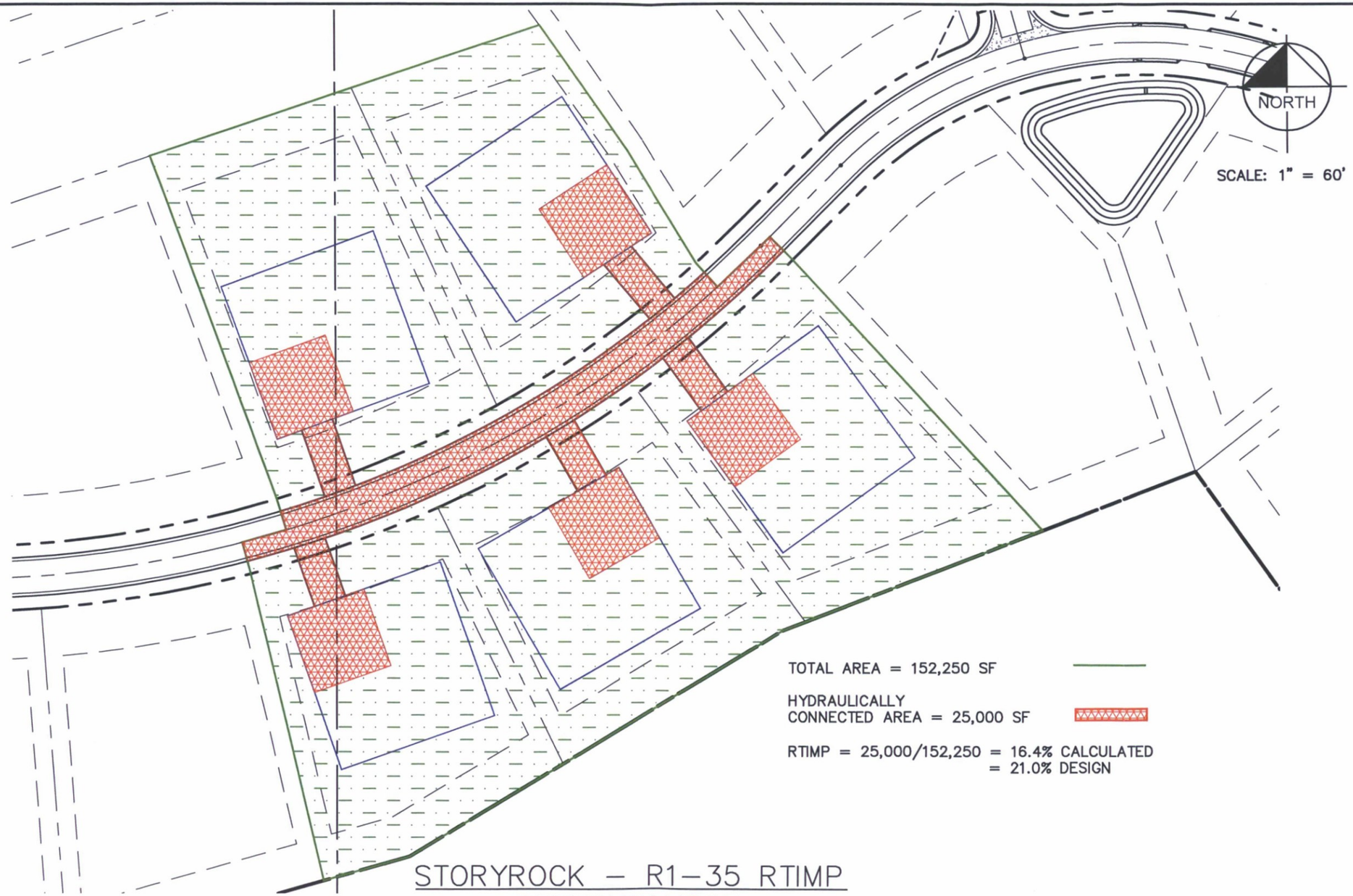
Objective: Land Use Hec-1 Values

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



STORYROCK – R1–35 RTIMP
DETERMINATION

Kimley»Horn

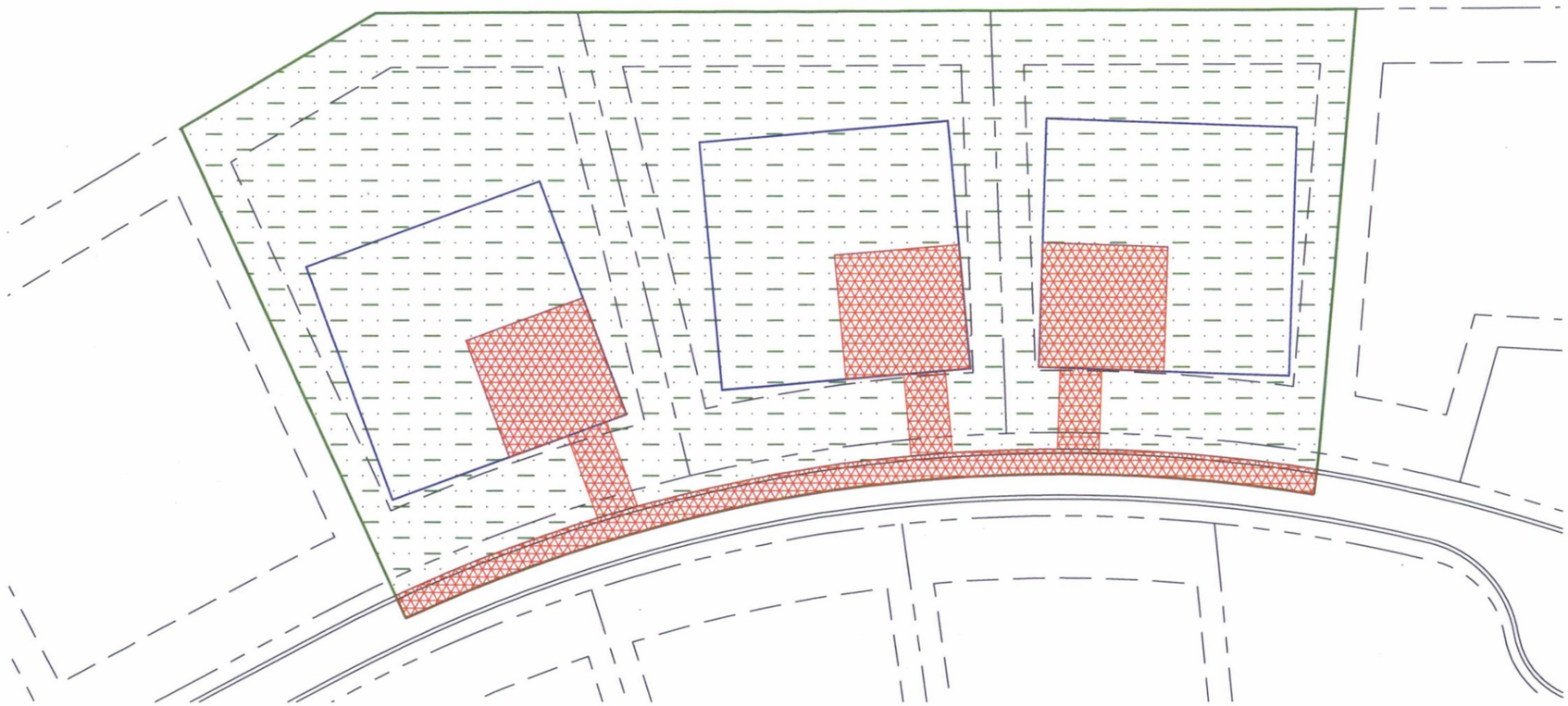
NORTH

SCALE: 1" = 60'

TOTAL AREA = 123,750 SF

HYDRAULICALLY
CONNECTED AREA = 19,000 SF

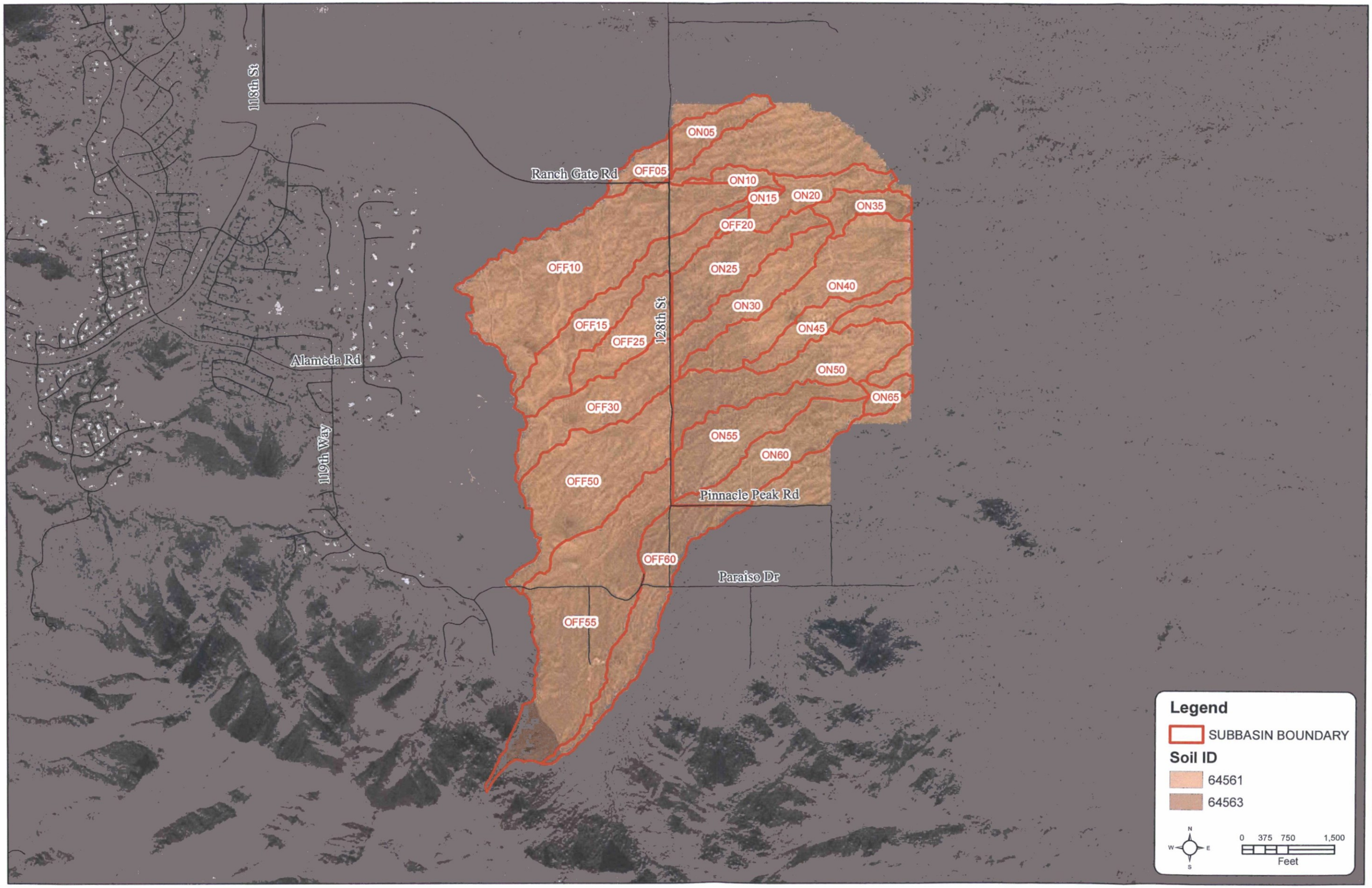
RTIMP = 19,000/123,750 = 15.4% CALCULATED
17.0% DESIGN



STORYROCK – R1–43 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	0.011	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	
OFF95	645	61	64561	0.064	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	
ON155	645	61	64561	0.017	100.00	0.150	-	100	
ON160	645	61	64561	0.020	100.00	0.150	-	100	
ON161	645	61	64561	0.010	100.00	0.150	-	100	
ON165	645	61	64561	0.008	100.00	0.150	-	100	
ON170	645	61	64561	0.005	100.00	0.150	-	100	
ON175	645	61	64561	0.002	100.00	0.150	-	100	
ON179	645	61	64561	0.002	100.00	0.150	-	100	
ON180	645	61	64561	0.005	100.00	0.150	-	100	
ON181	645	61	64561	0.004	100.00	0.150	-	100	
ON182	645	61	64561	0.009	100.00	0.150	-	100	
ON183	645	61	64561	0.007	100.00	0.150	-	100	
ON184	645	61	64561	0.009	100.00	0.150	-	100	
ON185	645	61	64561	0.002	100.00	0.150	-	100	
ON190	645	61	64561	0.006	100.00	0.150	-	100	
ON191	645	61	64561	0.006	100.00	0.150	-	100	
ON195	645	61	64561	0.009	100.00	0.150	-	100	
ON200	645	61	64561	0.006	100.00	0.150	-	100	
ON205	645	61	64561	0.020	100.00	0.150	-	100	
ON210	645	61	64561	0.017	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	
ON235	645	61	64561	0.002	100.00	0.150	-	100	
ON240	645	61	64561	0.007	100.00	0.150	-	100	
ON245	645	61	64561	0.003	100.00	0.150	-	100	
ON260	645	61	64561	0.003	100.00	0.150	-	100	
ON265	645	61	64561	0.002	100.00	0.150	-	100	
ON270	645	61	64561	0.002	100.00	0.150	-	100	
ON280	645	61	64561	0.001	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(11"): 1"=800'
SCALE(17): N/A
DESIGNED BY: MAW
DRAWN BY: PW
CHECKED BY: MAW
DATE: AUGUST 2014

CAVALLIERE
EXISTING SOILS MAP

PROJECT NO.
191069013

DRAWING NAME
Existing_Soils.mxd

Storage Basin ID: DB160

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	0.5	0.5		
Spillway Length:	-NA-	**Discharge (cfs)**	0	3	7	9	14	17	20	65	0	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	1.0	2.0	3.0	4.0	5.0	6.0	6.2	-	-
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)**	0.11	0.00	0.33	0.00	0.00	0.45
Length of Dam:	-NA-	**Peak Stage (ft)**	3.00	0.00	5.33	0.00	0.00	6.19
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	9.00	0.00	18.00	0.00	0.00	62.00
Weir Coefficient:	-NA-							

Storage Basin ID: DB180

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	0.3	0.4	0.4		
Spillway Length:	-NA-	**Discharge (cfs)**	0	1	3	4	5	5	6	6	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)**	0.06	0.00	0.14	0.00	0.00	0.26
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	3.00	0.00	0.00	5.00
Weir Coefficient:	-NA-							

Storage Basin ID:	**DB181**										
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			
Spillway Length:	-NA-	**Discharge (cfs)**	0	1	1	2	2	2	2	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)**	0.06	0.00	0.06	0.00	0.00	0.20				
Length of Dam:	-NA-	**Peak Stage (ft)**	0.50	0.00	0.50	0.00	0.00	1.50				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	1.00	0.00	1.00	0.00	0.00	2.00				
Weir Coefficient:	-NA-											

Storage Basin ID:	**DB182**										
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	0.3	
Spillway Length:	-NA-	**Discharge (cfs)**	0	2	4	7	9	11	13	14	44	0
Discharge Coefficient:	-NA-	**Elevation (ft)**	-	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	-
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)**	0.04	0.00	0.18	0.00	0.00	0.34				
Length of Dam:	-NA-	**Peak Stage (ft)**	1.50	0.00	3.00	0.00	0.00	4.00				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	7.00	0.00	13.00	0.00	0.00	44.00				
Weir Coefficient:	-NA-											

Storage Basin ID:	**DB184**										
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	0.6	0.7	0.7		
Spillway Length:	-NA-	**Discharge (cfs)**	0	0	1	1	1	2	2	10	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)**	0.24	0.00	0.24	0.00	0.00	0.72				
Length of Dam:	-NA-	**Peak Stage (ft)**	1.00	0.00	1.00	0.00	0.00	3.00				
Discharge Coefficient:	-NA-	**Peak Discharge (cfs)**	1.00	0.00	1.00	0.00	0.00	10.00				
Weir Coefficient:	-NA-											

Kimley»Horn

Project ***Storyrock Phase 1C***
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

DB160 ***Drains in 0.24 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	233	0.01				0		0	0	0
			0.01	1.0	0.01		0.07			
1	534	0.01				0.01		3	0	3
			0.04	1.0	0.04		0.09			
2	2,609	0.06				0.04		7	0	7
			0.05	1.0	0.05		0.08			
3	1,955	0.04				0.10		9	0	9
			0.06	1.0	0.06		0.07			
4	3,465	0.08				0.16		14	0	14
			0.11	1.0	0.11		0.09			
5	6,173	0.14				0.27		17	0	17
			0.18	1.0	0.18		0.05			
6	9,419	0.22				0.45		20	42	62

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 1C***
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

DB180 ***Drains in 1.83 hours***

Outlet Diameter	1.00 ft	Outlet X-Sect Area	0.785 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	4,055	0.09				0		0	0	0
			0.11	1.0	0.11		1.02			
1	5,153	0.12				0.11		3	0	3
			0.13	1.0	0.13		0.45			
2	6,372	0.15				0.24		5	0	5
			0.16	1.0	0.16		0.37			
3	7,711	0.18				0.40		6	0	6

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 1C***
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

DB181 ***Drains in 7.06 hours***

Outlet Diameter	0.50 ft	Outlet X-Sect Area	0.196 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	4,845	0.11				0		0	0	0
			0.12	1.0	0.12		3.69			
1	6,032	0.14				0.12		1	0	1
			0.15	1.0	0.15		1.79			
2	7,322	0.17				0.28		1	0	1
			0.18	1.0	0.18		1.58			
3	8,718	0.20				0.46		2	0	2

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 1C***
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

DB182 ***Drains in 0.34 hours***

Outlet Diameter	1.50 ft	Outlet X-Sect Area	1.767 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	329	0.01				0		0	0	0
			0.02	1.0	0.02		0.13			
1	1,502	0.03				0.02		4	0	4
			0.05	1.0	0.05		0.10			
2	3,270	0.08				0.08		9	0	9
			0.10	1.0	0.10		0.11			
3	5,600	0.13				0.18		13	0	13
			0.16	1.0	0.16		0.07			
4	8,135	0.19				0.34		16	28	44

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 1C***
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

DB184 ***Drains in 8.81 hours***

Outlet Diameter	0.50 ft	Outlet X-Sect Area	0.196 ft^2
Outlet Elevation	0 ft	No. of Outlet Barrels	1
		Outlet Pipe Slope	0.02 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	7,542	0.17				0		0.0	0	0
			0.19	1.0	0.19		5.60			
1	8,978	0.21				0.19		1	0	1
			0.22	1.0	0.22		2.62			
2	10,538	0.24				0.41		1	0	1
			0.26	1.0	0.26		0.58			
3	12,221	0.28				0.67		2	8	10

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.

Project ***Storyrock Phase 1C***
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)
DB160	0.45	6.00	*	62	62	0	1.50	0.24	In-Line	0.11	0.33	0.45
DB180	0.40	3.00	4:1	12	6	6	1.00	1.83	Standard	0.06	0.14	0.26
DB181	0.46	3.00	4:1	10	2	8	0.50	7.06	Standard	0.06	0.06	0.20
DB182	0.34	4.00	*	44	44	0	1.50	0.34	In-Line	0.04	0.18	0.34
DB184	0.67	3.00	4:1	23	10	13	0.50	8.81	Standard	0.24	0.24	0.72

Project ***Storyrock Phase 1C***
Subject **First Flush Summary**
Designed by **ZJH** Date 2/5/2016 Project No. 191069020
Checked by **JMB** Date 2/5/2016

Objective: First Flush Summary

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)
ON155	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON160	Stormceptor /Alternate First Flush Method	58,703	1.35	0.05	0.14
ON161	N/A*	N/A	N/A	N/A	N/A
ON165	Stormceptor /Alternate First Flush Method	40,197	0.92	0.04	-
ON175	N/A*	N/A	N/A	N/A	N/A
ON180	Basin	131,097	3.01	0.12	0.40
ON181	Basin	118,054	2.71	0.11	0.46
ON182	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON183	N/A*	N/A	N/A	N/A	N/A
ON184	Basin	242,791	5.57	0.22	0.67
ON190	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A
ON191	Stormceptor /Alternate First Flush Method	N/A	N/A	N/A	N/A

Note* Direct discharge of lot drainage only.

Route ID	Shape	Length (ft)	Slope (ft/ft)	Manning's N	Diameter (in)	Height (ft)	Width (ft)	Side Slope (h/v)
KINEMATIC WAVE								
Major Basin 01								
RO155A	PIPE	837.00	0.2900	0.013	24	-	-	-

```
 82          KK  CO155B COMBINE
 83          HC       2
             *

 84          KK   ON145   BASIN
 85          BA   0.014
 86          LG    0.31    0.38    6.00    0.19       9
 87          UC  0.341   0.514
 88          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 89          UA     100
             *

 90          KK  RO160A   ROUTE
 91          RS       1    FLOW
 92          RC   0.050   0.035   0.050     581  0.0280    0.00
 93          RX    0.00    6.00   12.00   18.00   22.00   28.00   34.00   40.00
 94          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 95          KK   ON150   BASIN
 96          BA   0.007
 97          LG    0.35    0.40    6.00    0.18       0
 98          UC   0.265   0.331
 99          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
100          UA     100
             *

101          KK  RO160B   ROUTE
102          RS       1    FLOW
103          RC   0.050   0.035   0.050     800  0.0300    0.00
104          RX    0.00    6.00   10.00   14.00   16.00   18.00   22.00   28.00
105          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

106          KK  CO160A COMBINE
107          HC       2
             *

108          KK  RO160C   ROUTE
109          RS       1    FLOW
110          RC   0.050   0.035   0.050     794  0.0300    0.00
111          RX    0.00    6.00   17.00   22.00   28.00   32.00   36.00   48.00
112          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

113          KK   ON160   BASIN
114          BA   0.020
115          LG    0.33    0.33    6.00    0.20      14
116          UC   0.428   0.904
117          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
118          UA     100
             *

119          KK  CO160B COMBINE
120          HC       2
             *

121          KK   DB160 STORAGE
122          KO
123          RS       1    STOR
124          SV            0.01    0.05    0.11    0.16    0.27    0.45    0.45
125          SQ            3.00    7.00    9.00   14.00   17.00   20.00   65.00
126          SE            1.00    2.00    3.00    4.00    5.00    6.00    6.24
             *

127          KK  RO161   ROUTE
128          RS       1    FLOW
129          RC   0.050   0.035   0.050    1451  0.0312    0.00
130          RX    0.00   12.00   20.00   29.00   36.00   40.00   50.00   54.00
131          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
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 134          LG    0.34    0.37    6.00    0.18       5
 135          UC   0.348   0.636
 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   CO161 COMBINE
 139          HC       2
              *


 140          KK   RO170   ROUTE
 141          RS       1    FLOW
 142          RC   0.050   0.035   0.050     585  0.0310    0.00
 143          RX    0.00    1.00    3.00    4.00   10.00   11.00   15.00   20.00
 144          RY    2.00    2.00    2.00    0.00    0.00    2.00    2.00    2.00
              *


 145          KK   ON170   BASIN
 146          BA   0.005
 147          LG    0.35    0.40    6.00    0.18       0
 148          UC   0.265   0.360
 149          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 150          UA     100
              *
1                                        HEC-1 INPUT                                    PAGE  5

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


 151          KK   ON184   BASIN
 152          BA   0.009
 153          LG    0.30    0.25    6.00    0.22      27
 154          UC   0.186   0.212
 155          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 156          UA     100
              *


 157          KK   DB184 STORAGE
 158          KO
 159          RS       1    STOR
 160          SV            0.12    0.24    0.36    0.48    0.60    0.72    0.72
 161          SQ                    1.00    1.00    1.00    2.00    2.00   10.00
 162          SE            0.50    1.00    1.50    2.00    2.50    2.98    3.00
              *


 163          KK   RO170   ROUTE
 164          RS       1    FLOW
 165          RC   0.050   0.035   0.050     585  0.0310    0.00
 166          RX    0.00    1.00    3.00    4.00   10.00   11.00   15.00   20.00
 167          RY    2.00    2.00    2.00    0.00    0.00    2.00    2.00    2.00
              *


 168          KK   CO170 COMBINE
 169          HC       3
              *


 170          KK   ON165   BASIN
 171          BA   0.008
 172          LG    0.31    0.27    6.00    0.21      24
 173          UC   0.274   0.594
 174          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 175          UA     100
              *


 176          KK   ON175   BASIN
 177          BA   0.002
 178          LG    0.30    0.25    6.00    0.17      17
 179          UC   0.099   0.103
 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   COEX1 COMBINE
 183          HC       4
              *


 184          KK   ON180   BASIN
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187         UC   0.181   0.235
188         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
189         UA     100
            *
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LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

190         KK   DB180 STORAGE
191         KO
192         RS       1    STOR
193         SV            0.06    0.14    0.20    0.26    0.34    0.39    0.40
194         SQ            1.00    3.00    4.00    5.00    5.00    6.00    6.00
195         SE            0.50    1.00    1.50    2.00    2.50    2.95    3.00
            *

196         KK   RO182A   ROUTE
197         RS       1    FLOW
198         RC   0.050   0.035   0.050     555  0.0340    0.00
199         RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
200         RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
            *

201         KK   ON179   BASIN
202         BA   0.002
203         LG    0.35    0.40    6.00    0.18       0
204         UC   0.181   0.228
205         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
206         UA     100
            *

207         KK   RO182C   ROUTE
208         RS       1    FLOW
209         RC   0.050   0.035   0.050     952  0.0340    0.00
210         RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
211         RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
            *

212         KK   ON195   BASIN
213         BA   0.009
214         LG    0.35    0.40    6.00    0.18       0
215         UC   0.327   0.484
216         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
217         UA     100
            *

218         KK   RO182B   ROUTE
219         RS       1    FLOW
220         RC   0.050   0.035   0.050    1027  0.0340    0.00
221         RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
222         RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
            *

223         KK   ON182   BASIN
224         BA   0.009
225         LG    0.32    0.32    6.00    0.20      15
226         UC   0.230   0.281
227         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
228         UA     100
            *
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LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

229         KK   CO182 COMBINE
230         HC       4
            *

231         KK   DB182 STORAGE
232         KO
233         RS       1    STOR
234         SV            0.01    0.02    0.04    0.05    0.13    0.18    0.26    0.34
235         SQ            2.00    4.00    7.00    9.00   11.00   13.00   14.00   44.00
236         SE            0.50    1.00    1.50    2.00    2.50    3.00    3.50    4.00
            *
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         238        BA   0.004
         239        LG    0.31    0.29    6.00    0.21      20
         240        UC   0.165   0.227
         241        UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
         242        UA     100
                    *

         243        KK  DB181 STORAGE
         244        KO
         245        RS       1    STOR
         246        SV            0.06    0.12    0.20    0.28    0.37    0.46
         247        SQ            1.00    1.00    2.00    2.00    2.00    2.00
         248        SE            0.50    1.00    1.50    2.00    2.50    3.00
                    *

         249        KK CO183A COMBINE
         250        HC       2
                    *

         251        KK RO183A   ROUTE
         252        RS       1    FLOW
         253        RC   0.050   0.035   0.050    1262  0.0360    0.00
         254        RX    0.00   10.00   18.00   22.00   29.00   34.00   38.00   43.00
         255        RY    2.00    1.50    1.00    0.00    0.00    1.00    1.50    2.00
                    *

         256        KK   ON183   BASIN
         257        BA   0.007
         258        LG    0.33    0.34    6.00    0.18       9
         259        UC   0.299   0.575
         260        UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
         261        UA     100
                    *

         262        KK   ON190   BASIN
         263        BA   0.006
         264        LG    0.32    0.30    6.00    0.20      18
         265        UC   0.225   0.374
         266        UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
         267        UA     100
                    *
1                                                HEC-1 INPUT                                           PAGE  8

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

         268        KK RO183B   ROUTE
         269        RS       1    FLOW
         270        RC   0.050   0.035   0.050     621  0.0360    0.00
         271        RX    0.00   10.00   18.00   22.00   29.00   34.00   38.00   43.00
         272        RY    2.00    1.50    1.00    0.00    0.00    1.00    1.50    2.00
                    *

         273        KK CO183B COMBINE
         274        HC       2
                    *

         275        KK   ON185   BASIN
         276        BA   0.002
         277        LG    0.35    0.40    6.00    0.18       0
         278        UC   0.179   0.226
         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   ON191   BASIN
         282        BA   0.006
         283        LG    0.31    0.27    6.00    0.18      17
         284        UC   0.161   0.187
         285        UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
         286        UA     100
                    *

         287        KK  OFF105   BASIN
         288        BA   0.085
         289        LG    0.35    0.40    6.00    0.18       0
         290        UC   0.538   0.678
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                *
293             KK  RO215A   ROUTE
294             RS       1    FLOW
295             RC   0.050   0.035   0.050     975  0.0360    0.00
296             RX    0.00    9.00   21.00   25.00   32.00   36.00   70.00   90.00
297             RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *
298             KK  OFF110   BASIN
299             BA   0.037
300             LG    0.35    0.40    6.00    0.18       0
301             UC   0.428   0.595
302             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
303             UA     100
                *
1                                        HEC-1 INPUT                                        PAGE  9

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

304             KK  OFF115   BASIN
305             BA   0.007
306             LG    0.35    0.40    6.00    0.18       0
307             UC   0.227   0.236
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   RO220   ROUTE
311             RS       1    FLOW
312             RC   0.050   0.035   0.050     310  0.0420    0.00
313             RX    0.00    8.00   15.00   21.00   21.10   25.00   30.00   36.00
314             RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *
315             KK   ON220   BASIN
316             BA   0.003
317             LG    0.35    0.40    6.00    0.18       0
318             UC   0.222   0.326
319             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
320             UA     100
                *
321             KK   CO220 COMBINE
322             HC       2
                *
323             KK  RO215D   ROUTE
324             RS       1    FLOW
325             RC   0.050   0.035   0.050     364  0.0300    0.00
326             RX    0.00    5.00    8.00   11.00   11.10   14.00   17.00   24.00
327             RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *
328             KK  CO215A COMBINE
329             HC       2
                *
330             KK  RO215B   ROUTE
331             RS       1    FLOW
332             RC   0.050   0.035   0.050     800  0.0340    0.00
333             RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
334             RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *
335             KK  CO215B COMBINE
336             HC       2
                *
1                                        HEC-1 INPUT                                        PAGE 10

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

337             KK  RO215C   ROUTE
338             RS       1    FLOW
339             RC   0.050   0.035   0.050     445  0.0340    0.00
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                *
     342        KK   ON215   BASIN
     343        BA   0.030
     344        LG    0.35    0.40    6.00    0.18       0
     345        UC   0.349   0.341
     346        UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
     347        UA     100
                *

     348        KK  CO215C COMBINE
     349        HC       2
                *

     350        KK  RO240A   ROUTE
     351        RS       1    FLOW
     352        RC   0.050   0.035   0.050     245  0.0370    0.00
     353        RX    0.00    5.00   10.00   14.00   32.00   41.00   48.00   52.00
     354        RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *

     355        KK   ON235   BASIN
     356        BA   0.002
     357        LG    0.35    0.40    6.00    0.18       0
     358        UC   0.176   0.222
     359        UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
     360        UA     100
                *

     361        KK  CO240A COMBINE
     362        HC       2
                *

     363        KK  RO240B   ROUTE
     364        RS       1    FLOW
     365        RC   0.050   0.035   0.050     465  0.0390    0.00
     366        RX    0.00    7.00   19.00   49.00   65.00   70.00   77.00   85.00
     367        RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *

     368        KK   ON240   BASIN
     369        BA   0.007
     370        LG    0.35    0.40    6.00    0.18       0
     371        UC   0.276   0.380
     372        UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
     373        UA     100
                *
1                                        HEC-1 INPUT                                        PAGE 11

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

     374        KK  CO240B COMBINE
     375        HC       2
                *

     376        KK  RO260A   ROUTE
     377        RS       1    FLOW
     378        RC   0.050   0.035   0.050     225  0.0360    0.00
     379        RX    0.00    7.00   15.00   26.00   29.00   34.00   42.00   50.00
     380        RY    2.00    1.00    0.00    0.00    1.00    1.00    0.50    1.00
                *

     381        KK   ON245   BASIN
     382        BA   0.003
     383        LG    0.35    0.40    6.00    0.18       0
     384        UC   0.230   0.363
     385        UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
     386        UA     100
                *

     387        KK  RO260B   ROUTE
     388        RS       1    FLOW
     389        RC   0.050   0.035   0.050     361  0.0280    0.00
     390        RX    0.00   23.00   44.00   69.00   70.00   85.00   92.00  104.00
     391        RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *
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 393         BA   0.003
 394         LG    0.35    0.40    6.00    0.18       0
 395         UC   0.212   0.265
 396         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 397         UA     100
             *

 398         KK   CO260 COMBINE
 399         HC       3
             *

 400         KK  RO200A   ROUTE
 401         RS       1    FLOW
 402         RC   0.050   0.035   0.050     611  0.0360    0.00
 403         RX    0.00    5.00   12.00   45.00   61.00   68.00   73.00   78.00
 404         RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 405         KK   ON265   BASIN
 406         BA   0.002
 407         LG    0.35    0.40    6.00    0.18       0
 408         UC   0.203   0.318
 409         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 410         UA     100
             *
```



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

 411         KK  RO200B   ROUTE
 412         RS       1    FLOW
 413         RC   0.050   0.035   0.050     345  0.0290    0.00
 414         RX    0.00    6.00   12.00   20.00   21.00   41.00   47.00   51.00
 415         RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 416         KK   ON200   BASIN
 417         BA   0.006
 418         LG    0.35    0.40    6.00    0.18       0
 419         UC   0.249   0.320
 420         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 421         UA     100
             *

 422         KK   ON270   BASIN
 423         BA   0.002
 424         LG    0.35    0.40    6.00    0.18       0
 425         UC   0.193   0.273
 426         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 427         UA     100
             *

 428         KK   CO200 COMBINE
 429         HC       4
             *

 430         KK   RO205   ROUTE
 431         RS       1    FLOW
 432         RC   0.050   0.035   0.050    1565  0.0370    0.00
 433         RX    0.00    6.00   10.00   15.00   48.00   58.00   64.00   77.00
 434         RY    4.00    2.00    1.00    0.00    0.00    1.00    2.00    4.00
             *

 435         KK   ON205   BASIN
 436         BA   0.020
 437         LG    0.35    0.39    6.00    0.18       2
 438         UC   0.359   0.454
 439         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 440         UA     100
             *

 441         KK   ON280   BASIN
 442         BA   0.001
 443         LG    0.35    0.40    6.00    0.18       0
 444         UC   0.136   0.158
 445         UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
```

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

       447          KK   RO210   ROUTE
       448          RS       1    FLOW
       449          RC   0.050   0.035   0.050    1804  0.0382    0.00
       450          RX    0.00    2.00    4.00    5.00   10.00   12.00   14.00   18.00
       451          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                    *

       452          KK   ON210   BASIN
       453          BA   0.017
       454          LG    0.35    0.40    6.00    0.18       0
       455          UC   0.410   0.620
       456          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
       457          UA     100
                    *

       458          KK   CO205 COMBINE
       459          HC       4
                    *
       460          ZZ
```

1

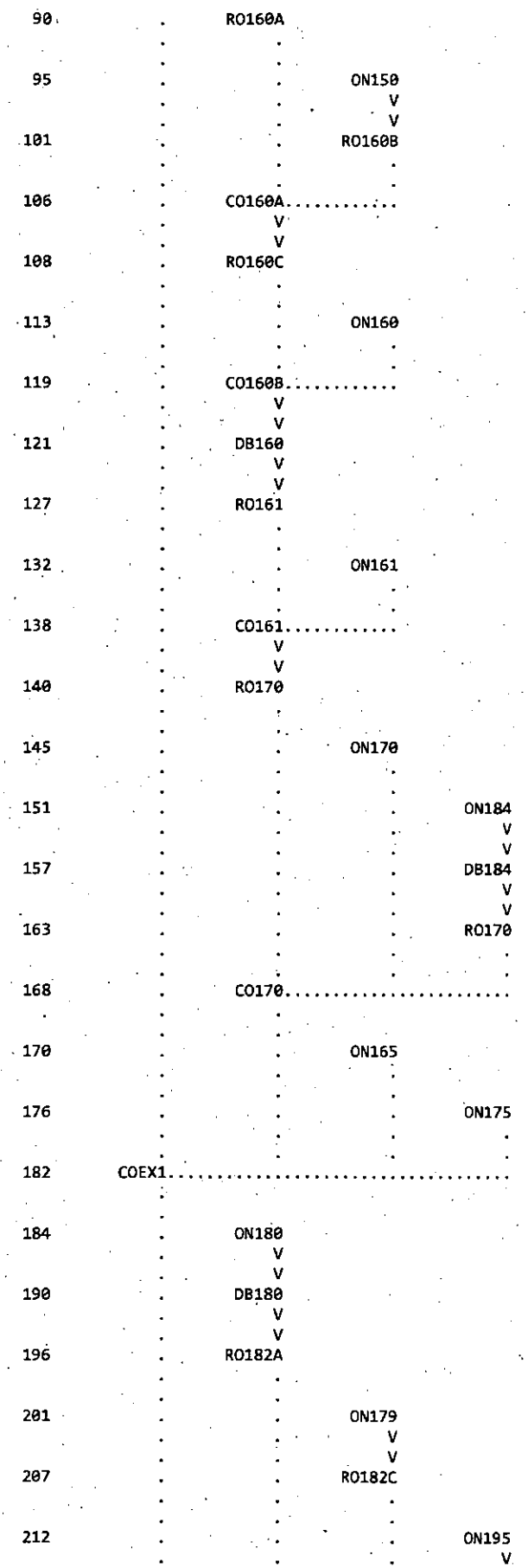
SCHEMATIC DIAGRAM OF STREAM NETWORK

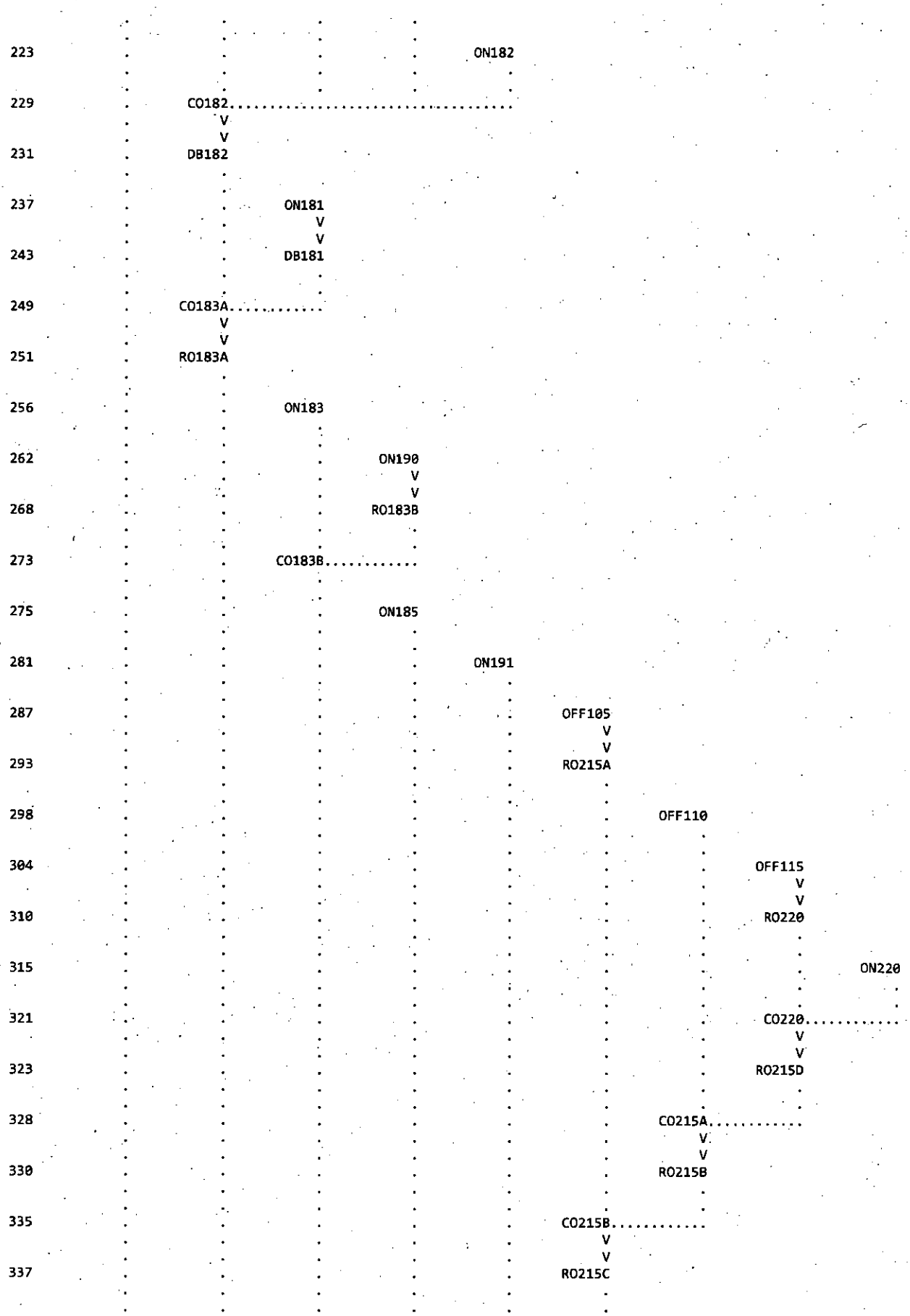
INPUT LINE NO.

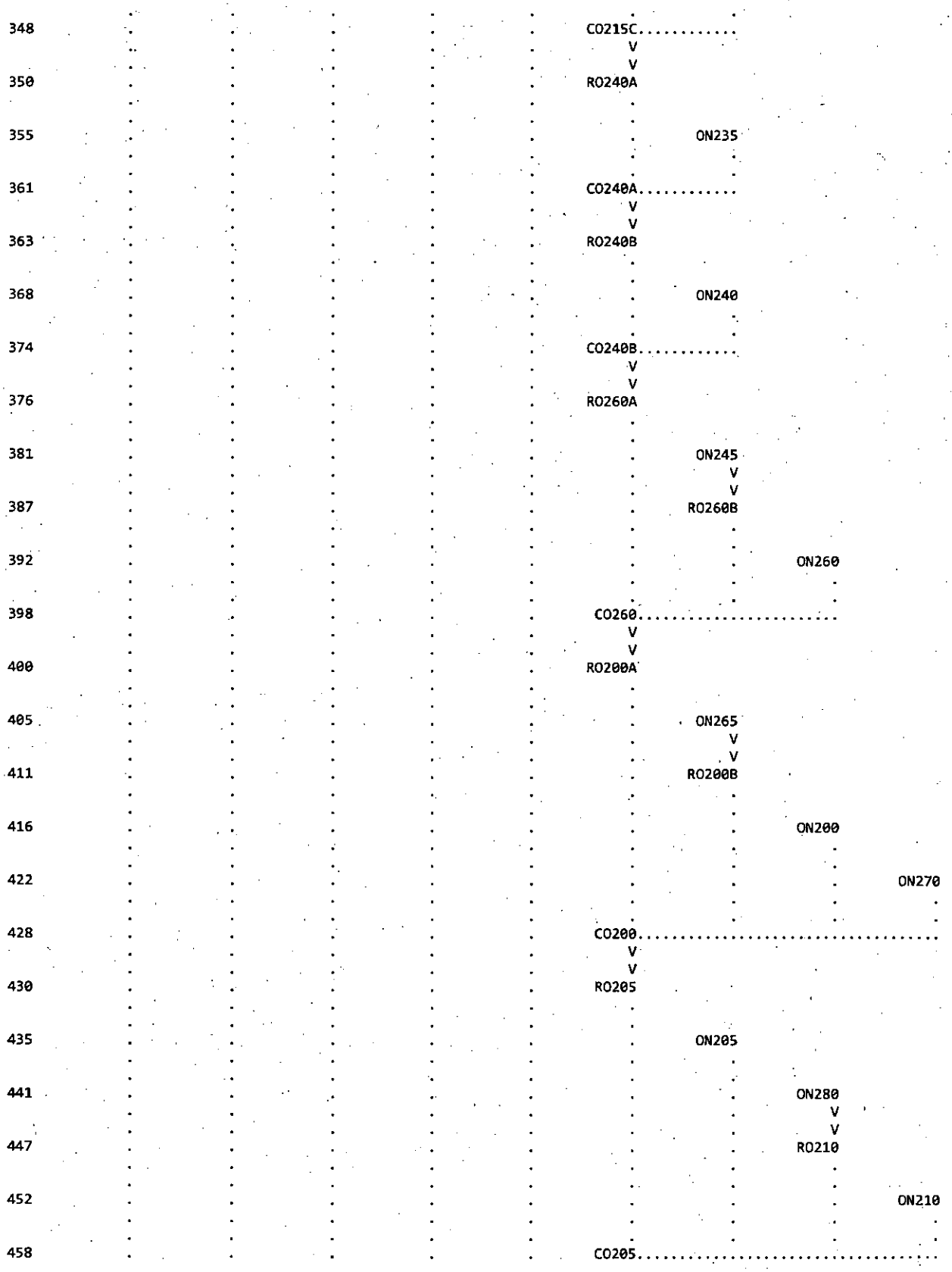
(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW

```
    19   OFF95
           V
           V
    25   RO140A
           .
           .
    30     .      OFF100
           .        V
           .        V
    36     .      RO140B
           .        .
           .        .
    41   CO140A.....
           V
           V
    43   RO140C
           .
           .
    48     .       ON140
           .        .
           .        .
    54   CO140B.....
           V
           V
    56   RO155B
           .
           .
    61     .       ON135
           .        V
           .        V
    67     .      RO155A
           .        .
           .        .
    69   CO155A.....
           V
           V
    71   RO155C
           .
           .
    76     .       ON155
           .        .
           .        .
    82   CO155B.....
           .
           .
    84     .       ON145
```


90 RO160A
95 ON150
101 RO160B
106 CO160A
108 RO160C
113 ON160
119 CO160B
121 DB160
127 RO161
132 ON161
138 CO161
140 RO170
145 ON170
151 ON184
157 DB184
163 RO170
168 CO170
170 ON165
176 ON175
182 COEX1
184 ON180
190 DB180
196 RO182A
201 ON179
207 RO182C
212 ON195


223
ON182
229
CO182
V
V
231
DB182
237
ON181
V
V
243
DB181
249
CO183A
V
V
251
RO183A
256
ON183
262
ON190
V
V
268
RO183B
273
CO183B
275
ON185
281
ON191
287
OFF105
V
V
293
RO215A
298
OFF110
304
OFF115
V
V
310
RO220
315
ON220
321
CO220
V
V
323
RO215D
328
CO215A
V
V
330
RO215B
335
CO215B
V
V
337
RO215C



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

* *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* JUN 1998 *

* *

****

****

* *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

Flood Control District of Maricopa County
STORYROCK PH1C PROP - STORYROCK PHASE 1C PROP CONDITION
2 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
02/19/2017

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
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								

*** ***

****
* *

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


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


          **************
          *            *
157 KK    *     DB184  *      STORAGE
          *            *
          **************

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


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


          **************
          *            *
190 KK    *     DB180  *      STORAGE
          *            *
          **************

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


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


          **************
          *            *
231 KK    *     DB182  *      STORAGE
          *            *
          **************

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


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


          **************
          *            *
243 KK    *     DB181  *      STORAGE
          *            *
          **************

244 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

                                   PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
        OPERATION      STATION     FLOW     PEAK                                           AREA      STAGE     MAX STAGE
```

	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	18.	4.50	3.	1.	0.	0.09
	ROUTED TO						
+	RO155B	17.	4.58	3.	1.	0.	0.09
	HYDROGRAPH AT						
+	ON135	2.	4.25	0.	0.	0.	0.01
	ROUTED TO						
+	RO155A	2.	4.25	0.	0.	0.	0.01
	2 COMBINED AT						
+	CO155A	18.	4.58	3.	1.	0.	0.10
	ROUTED TO						
+	RO155C	18.	4.58	3.	1.	0.	0.10
	HYDROGRAPH AT						
+	ON155	7.	4.17	1.	0.	0.	0.02
	2 COMBINED AT						
+	CO155B	21.	4.58	4.	1.	0.	0.12
	HYDROGRAPH AT						
+	ON145	5.	4.25	1.	0.	0.	0.01
	ROUTED TO						
+	RO160A	4.	4.33	1.	0.	0.	0.01
	HYDROGRAPH AT						
+	ON150	2.	4.17	0.	0.	0.	0.01
	ROUTED TO						
+	RO160B	2.	4.25	0.	0.	0.	0.01
	2 COMBINED AT						
+	CO160A	7.	4.25	1.	0.	0.	0.02
	ROUTED TO						
+	RO160C	6.	4.33	1.	0.	0.	0.02
	HYDROGRAPH AT						
+	ON160	5.	4.33	1.	0.	0.	0.02
	2 COMBINED AT						
+	CO160B	11.	4.33	2.	0.	0.	0.04
	ROUTED TO						
+	DB160	9.	4.58	2.	0.	0.	0.04
	ROUTED TO						
+	RO161	8.	4.67	2.	0.	0.	0.04
	HYDROGRAPH AT						
+	ON161	3.	4.25	0.	0.	0.	0.01

+	CO161	10.	4.58	2.	1.	0.	0.05
	ROUTED TO						
+	RO170	10.	4.67	2.	1.	0.	0.05
	HYDROGRAPH AT						
+	ON170	2.	4.17	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	ON184	7.	4.08	1.	0.	0.	0.01
	ROUTED TO						
+	DB184	1.	4.50	0.	0.	0.	0.01
	ROUTED TO						
+	RO170	1.	4.83	0.	0.	0.	0.01
	3 COMBINED AT						
+	CO170	11.	4.58	3.	1.	0.	0.06
	HYDROGRAPH AT						
+	ON165	3.	4.25	1.	0.	0.	0.01
	HYDROGRAPH AT						
+	ON175	2.	4.00	0.	0.	0.	0.00
	4 COMBINED AT						
+	COEX1	34.	4.58	7.	2.	1.	0.19
	HYDROGRAPH AT						
+	ON180	3.	4.08	0.	0.	0.	0.00
	ROUTED TO						
+	DB180	1.	4.42	0.	0.	0.	0.00
	ROUTED TO						
+	RO182A	1.	4.42	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	ON179	1.	4.08	0.	0.	0.	0.00
	ROUTED TO						
+	RO182C	1.	4.25	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	ON195	2.	4.25	0.	0.	0.	0.01
	ROUTED TO						
+	RO182B	2.	4.33	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	ON182	5.	4.17	0.	0.	0.	0.01
	4 COMBINED AT						
+	CO182	8.	4.25	1.	0.	0.	0.02
	ROUTED TO						
+	DB182	7.	4.33	1.	0.	0.	0.02
	HYDROGRAPH AT						
+	ON181	3.	4.08	0.	0.	0.	0.00
	ROUTED TO						
+	DB181	1.	4.42	0.	0.	0.	0.00
	2 COMBINED AT						
+	CO183A	8.	4.33	1.	0.	0.	0.03
	ROUTED TO						
+	RO183A	8.	4.42	1.	0.	0.	0.03
	HYDROGRAPH AT						
+	ON183	2.	4.25	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	ON190	3.	4.17	0.	0.	0.	0.01

	2 COMBINED AT						
+		CO183B	5.	4.25	1.	0.	0.	0.01
	HYDROGRAPH AT						
+		ON185	1.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		ON191	5.	4.08	0.	0.	0.	0.01
	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						
+		CO220	4.	4.17	0.	0.	0.	0.01
	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
	ROUTED TO						
+		RO240A	31.	4.42	5.	1.	0.	0.16
	HYDROGRAPH AT						
+		ON235	1.	4.08	0.	0.	0.	0.00
	2 COMBINED AT						
+		CO240A	32.	4.42	5.	1.	0.	0.16
	ROUTED TO						
+		RO240B	32.	4.50	5.	1.	0.	0.16
	HYDROGRAPH AT						
+		ON240	2.	4.17	0.	0.	0.	0.01
	2 COMBINED AT						
+		CO240B	33.	4.50	5.	1.	0.	0.17
	ROUTED TO						
+		RO260A	33.	4.50	5.	1.	0.	0.17
	HYDROGRAPH AT						
+		ON245	1.	4.17	0.	0.	0.	0.00
	ROUTED TO						

```
          HYDROGRAPH AT
+                           ON260      1.    4.17          0.         0.         0.        0.00

          3 COMBINED AT
+                           CO260     34.    4.50          6.         1.         0.        0.18

          ROUTED TO
+                          RO200A     34.    4.50          6.         1.         0.        0.18

          HYDROGRAPH AT
+                           ON265      1.    4.17          0.         0.         0.        0.00

          ROUTED TO
+                          RO200B      1.    4.17          0.         0.         0.        0.00

          HYDROGRAPH AT
+                           ON200      2.    4.17          0.         0.         0.        0.01

          HYDROGRAPH AT
+                           ON270      1.    4.17          0.         0.         0.        0.00

          4 COMBINED AT
+                           CO200     35.    4.50          6.         1.         0.        0.19

          ROUTED TO
+                           RO205     34.    4.58          6.         1.         0.        0.19

          HYDROGRAPH AT
+                           ON205      6.    4.25          1.         0.         0.        0.02

          HYDROGRAPH AT
+                           ON280      1.    4.08          0.         0.         0.        0.00

          ROUTED TO
+                           RO210      0.    4.25          0.         0.         0.        0.00

          HYDROGRAPH AT
+                           ON210      4.    4.33          1.         0.         0.        0.02

          4 COMBINED AT
+                           CO205     40.    4.58          7.         2.         1.        0.23
1
                                        SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                           (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                INTERPOLATED TO
                                                                              COMPUTATION INTERVAL
          ISTAQ    ELEMENT      DT       PEAK     TIME TO     VOLUME       DT      PEAK     TIME TO     VOLUME
                                                    PEAK                                      PEAK

                               (MIN)     (CFS)     (MIN)       (IN)      (MIN)     (CFS)     (MIN)       (IN)

           FOR STORM = 1  STORM AREA (SQ MI) =       0.00
             RO155A  MANE       0.31      2.42    255.02       0.30       5.00      2.42    255.00       0.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1274E+00 EXCESS=0.0000E+00 OUTFLOW=0.1274E+00 BASIN STORAGE=0.3292E-18 PERCENT ERROR=   0.0

           FOR STORM = 2  STORM AREA (SQ MI) =       0.50
             RO155A  MANE       0.31      2.37    255.19       0.29       5.00      2.37    255.00       0.29

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1248E+00 EXCESS=0.0000E+00 OUTFLOW=0.1248E+00 BASIN STORAGE=0.3293E-18 PERCENT ERROR=   0.0


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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   19FEB17  TIME  11:22:29   *
*                                       *
*****************************************
```


```
*****************************************
*                                       *
*    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 PH1C PROP - STORYROCK PHASE 1C PROP CONDITION
  3           ID       10 YEAR
  4           ID       6 Hour  Storm
  5           ID       Unit Hydrograph: Clark
  6           ID       Storm: Multiple
  7           ID       02/19/2017
              *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           KK  OFF95   BASIN
 20           BA  0.064
 21           LG   0.35    0.40   6.00   0.18      0
 22           UC  0.453   0.579
 23           UA      0     3.0    5.0    8.0   12.0   20.0   43.0   75.0   90.0   96.0
 24           UA    100
              *

 25           KK  RO140A   ROUTE
 26           RS      1    FLOW
 27           RC  0.050   0.035  0.050    333 0.0270   0.00
 28           RX   0.00   27.00  30.00  34.00  34.20  40.00  47.00  82.00
 29           RY   3.00    2.00   1.00   0.00   0.00   1.00   2.00   3.00
              *

 30           KK  OFF100  BASIN
 31           BA  0.011
```

```
 34          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 35          UA     100
             *

 36          KK  RO140B   ROUTE
 37          RS       1    FLOW
 38          RC   0.050   0.035   0.050     626  0.0340    0.00
 39          RX    0.00    7.00    8.00   11.00   11.20   14.00   16.00   31.00
 40          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
1                                      HEC-1 INPUT                                    PAGE  2

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

 41          KK  CO140A COMBINE
 42          HC       2
             *

 43          KK  RO140C   ROUTE
 44          RS       1    FLOW
 45          RC   0.050   0.035   0.050    1210  0.0320    0.00
 46          RX    0.00    3.00    6.00   11.00   11.20   17.00   23.00   48.00
 47          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 48          KK   ON140   BASIN
 49          BA   0.017
 50          LG    0.34    0.39    6.00    0.18       4
 51          UC   0.328   0.483
 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  CO140B COMBINE
 55          HC       2
             *

 56          KK  RO155B   ROUTE
 57          RS       1    FLOW
 58          RC   0.050   0.035   0.050     910  0.0350    0.00
 59          RX    0.00   16.00   61.00   76.00   90.00  121.00  200.00  226.00
 60          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

 61          KK   ON135   BASIN
 62          BA   0.008
 63          LG    0.35    0.40    6.00    0.18       0
 64          UC   0.250   0.344
 65          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 66          UA     100
             *

 67          KK  RO155A   ROUTE
 68          RK     837  0.2900   0.013            CIRC   2.000
             *

 69          KK  CO155A COMBINE
 70          HC       2
             *

 71          KK  RO155C   ROUTE
 72          RS       1    FLOW
 73          RC   0.050   0.035   0.050     392  0.0330    0.00
 74          RX    0.00   14.00   22.00   30.00   42.00   54.00   68.00   90.00
 75          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *
1                                      HEC-1 INPUT                                    PAGE  3

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

 76          KK   ON155   BASIN
 77          BA   0.017
 78          LG    0.33    0.34    6.00    0.19      11
 79          UC   0.253   0.296
 80          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
```

```
 82          KK  CO155B COMBINE
 83          HC       2
             *

 84          KK   ON145   BASIN
 85          BA   0.014
 86          LG    0.31    0.38    6.00    0.19       9
 87          UC   0.290   0.428
 88          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 89          UA     100
             *

 90          KK  RO160A   ROUTE
 91          RS       1    FLOW
 92          RC   0.050   0.035   0.050     581  0.0280    0.00
 93          RX    0.00    6.00   12.00   18.00   22.00   28.00   34.00   40.00
 94          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 95          KK   ON150   BASIN
 96          BA   0.007
 97          LG    0.35    0.40    6.00    0.18       0
 98          UC   0.220   0.270
 99          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
100          UA     100
             *

101          KK  RO160B   ROUTE
102          RS       1    FLOW
103          RC   0.050   0.035   0.050     800  0.0300    0.00
104          RX    0.00    6.00   10.00   14.00   16.00   18.00   22.00   28.00
105          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

106          KK  CO160A COMBINE
107          HC       2
             *

108          KK  RO160C   ROUTE
109          RS       1    FLOW
110          RC   0.050   0.035   0.050     794  0.0300    0.00
111          RX    0.00    6.00   17.00   22.00   28.00   32.00   36.00   48.00
112          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

113          KK   ON160   BASIN
114          BA   0.020
115          LG    0.33    0.33    6.00    0.20      14
116          UC   0.366   0.760
117          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
118          UA     100
             *

119          KK  CO160B COMBINE
120          HC       2
             *

121          KK   DB160 STORAGE
122          KO
123          RS       1    STOR
124          SV            0.01    0.05    0.11    0.16    0.27    0.45    0.45
125          SQ            3.00    7.00    9.00   14.00   17.00   20.00   65.00
126          SE            1.00    2.00    3.00    4.00    5.00    6.00    6.24
             *

127          KK   RO161   ROUTE
128          RS       1    FLOW
129          RC   0.050   0.035   0.050    1451  0.0312    0.00
130          RX    0.00   12.00   20.00   29.00   36.00   40.00   50.00   54.00
131          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
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134          LG    0.34    0.37    6.00    0.18       5
135          UC   0.293   0.525
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   CO161 COMBINE
139          HC       2
             *

140          KK   RO170   ROUTE
141          RS       1    FLOW
142          RC   0.050   0.035   0.050     585  0.0310    0.00
143          RX    0.00    1.00    3.00    4.00   10.00   11.00   15.00   20.00
144          RY    2.00    2.00    2.00    0.00    0.00    2.00    2.00    2.00
             *

145          KK   ON170   BASIN
146          BA   0.005
147          LG    0.35    0.40    6.00    0.18       0
148          UC   0.220   0.293
149          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
150          UA     100
             *

1                                        HEC-1 INPUT                                    PAGE  5

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

151          KK   ON184   BASIN
152          BA   0.009
153          LG    0.30    0.25    6.00    0.22      27
154          UC   0.162   0.182
155          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
156          UA     100
             *

157          KK   DB184 STORAGE
158          KO
159          RS       1    STOR
160          SV            0.12    0.24    0.36    0.48    0.60    0.72    0.72
161          SQ                    1.00    1.00    1.00    2.00    2.00   10.00
162          SE            0.50    1.00    1.50    2.00    2.50    2.98    3.00
             *

163          KK   RO170   ROUTE
164          RS       1    FLOW
165          RC   0.050   0.035   0.050     585  0.0310    0.00
166          RX    0.00    1.00    3.00    4.00   10.00   11.00   15.00   20.00
167          RY    2.00    2.00    2.00    0.00    0.00    2.00    2.00    2.00
             *

168          KK   CO170 COMBINE
169          HC       3
             *

170          KK   ON165   BASIN
171          BA   0.008
172          LG    0.31    0.27    6.00    0.21      24
173          UC   0.237   0.508
174          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
175          UA     100
             *

176          KK   ON175   BASIN
177          BA   0.002
178          LG    0.30    0.25    6.00    0.17      17
179          UC   0.085   0.087
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   COEX1 COMBINE
183          HC       4
             *

184          KK   ON180   BASIN
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```
        187          UC   0.157   0.201
        188          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
        189          UA     100
                     *
1                                              HEC-1 INPUT                                        PAGE  6

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


        190          KK   DB180 STORAGE
        191          KO
        192          RS       1    STOR
        193          SV            0.06    0.14    0.20    0.26    0.34    0.39    0.40
        194          SQ            1.00    3.00    4.00    5.00    5.00    6.00    6.00
        195          SE            0.50    1.00    1.50    2.00    2.50    2.95    3.00
                     *

        196          KK  RO182A   ROUTE
        197          RS       1    FLOW
        198          RC   0.050   0.035   0.050     555  0.0340    0.00
        199          RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
        200          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                     *

        201          KK   ON179   BASIN
        202          BA   0.002
        203          LG    0.35    0.40    6.00    0.18       0
        204          UC   0.150   0.186
        205          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
        206          UA     100
                     *

        207          KK  RO182C   ROUTE
        208          RS       1    FLOW
        209          RC   0.050   0.035   0.050     952  0.0340    0.00
        210          RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
        211          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                     *

        212          KK   ON195   BASIN
        213          BA   0.009
        214          LG    0.35    0.40    6.00    0.18       0
        215          UC   0.272   0.394
        216          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
        217          UA     100
                     *

        218          KK  RO182B   ROUTE
        219          RS       1    FLOW
        220          RC   0.050   0.035   0.050    1027  0.0340    0.00
        221          RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
        222          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                     *

        223          KK   ON182   BASIN
        224          BA   0.009
        225          LG    0.32    0.32    6.00    0.20      15
        226          UC   0.197   0.237
        227          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
        228          UA     100
                     *
1                                              HEC-1 INPUT                                        PAGE  7

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


        229          KK   CO182 COMBINE
        230          HC       4
                     *

        231          KK   DB182 STORAGE
        232          KO
        233          RS       1    STOR
        234          SV            0.01    0.02    0.04    0.05    0.13    0.18    0.26    0.34
        235          SQ            2.00    4.00    7.00    9.00   11.00   13.00   14.00   44.00
        236          SE            0.50    1.00    1.50    2.00    2.50    3.00    3.50    4.00
                     *
```

```
238          BA   0.004
239          LG    0.31    0.29    6.00    0.21      20
240          UC   0.142   0.193
241          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
242          UA     100
             *

243          KK   DB181 STORAGE
244          KO
245          RS       1    STOR
246          SV            0.06    0.12    0.20    0.28    0.37    0.46
247          SQ            1.00    1.00    2.00    2.00    2.00    2.00
248          SE            0.50    1.00    1.50    2.00    2.50    3.00
             *

249          KK   CO183A COMBINE
250          HC       2
             *

251          KK   RO183A   ROUTE
252          RS       1     FLOW
253          RC   0.050   0.035   0.050    1262  0.0360    0.00
254          RX    0.00   10.00   18.00   22.00   29.00   34.00   38.00   43.00
255          RY    2.00    1.50    1.00    0.00    0.00    1.00    1.50    2.00
             *

256          KK   ON183   BASIN
257          BA   0.007
258          LG    0.33    0.34    6.00    0.18       9
259          UC   0.254   0.481
260          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
261          UA     100
             *

262          KK   ON190   BASIN
263          BA   0.006
264          LG    0.32    0.30    6.00    0.20      18
265          UC   0.193   0.317
266          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
267          UA     100
             *
```



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

268          KK   RO183B   ROUTE
269          RS       1     FLOW
270          RC   0.050   0.035   0.050     621  0.0360    0.00
271          RX    0.00   10.00   18.00   22.00   29.00   34.00   38.00   43.00
272          RY    2.00    1.50    1.00    0.00    0.00    1.00    1.50    2.00
             *

273          KK   CO183B COMBINE
274          HC       2
             *

275          KK   ON185   BASIN
276          BA   0.002
277          LG    0.35    0.40    6.00    0.18       0
278          UC   0.149   0.184
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   ON191   BASIN
282          BA   0.006
283          LG    0.31    0.27    6.00    0.18      17
284          UC   0.138   0.158
285          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
286          UA     100
             *

287          KK  OFF105   BASIN
288          BA   0.085
289          LG    0.35    0.40    6.00    0.18       0
290          UC   0.447   0.552
```

```
                *
  293           KK  RO215A   ROUTE
  294           RS       1    FLOW
  295           RC   0.050   0.035   0.050     975  0.0360    0.00
  296           RX    0.00    9.00   21.00   25.00   32.00   36.00   70.00   90.00
  297           RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *
  298           KK  OFF110   BASIN
  299           BA   0.037
  300           LG    0.35    0.40    6.00    0.18       0
  301           UC   0.356   0.484
  302           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  303           UA     100
                *
1                                        HEC-1 INPUT                                    PAGE  9

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

  304           KK  OFF115   BASIN
  305           BA   0.007
  306           LG    0.35    0.40    6.00    0.18       0
  307           UC   0.189   0.192
  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   RO220   ROUTE
  311           RS       1    FLOW
  312           RC   0.050   0.035   0.050     310  0.0420    0.00
  313           RX    0.00    8.00   15.00   21.00   21.10   25.00   30.00   36.00
  314           RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *
  315           KK   ON220   BASIN
  316           BA   0.003
  317           LG    0.35    0.40    6.00    0.18       0
  318           UC   0.184   0.266
  319           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  320           UA     100
                *
  321           KK   CO220 COMBINE
  322           HC       2
                *
  323           KK  RO215D   ROUTE
  324           RS       1    FLOW
  325           RC   0.050   0.035   0.050     364  0.0300    0.00
  326           RX    0.00    5.00    8.00   11.00   11.10   14.00   17.00   24.00
  327           RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *
  328           KK  CO215A COMBINE
  329           HC       2
                *
  330           KK  RO215B   ROUTE
  331           RS       1    FLOW
  332           RC   0.050   0.035   0.050     800  0.0340    0.00
  333           RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
  334           RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *
  335           KK  CO215B COMBINE
  336           HC       2
                *
1                                        HEC-1 INPUT                                    PAGE 10

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

  337           KK  RO215C   ROUTE
  338           RS       1    FLOW
  339           RC   0.050   0.035   0.050     445  0.0340    0.00
```

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                 *

 342             KK   ON215   BASIN
 343             BA   0.030
 344             LG    0.35    0.40    6.00    0.18       0
 345             UC   0.290   0.278
 346             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 347             UA     100
                 *

 348             KK  CO215C COMBINE
 349             HC       2
                 *

 350             KK  RO240A   ROUTE
 351             RS       1    FLOW
 352             RC   0.050   0.035   0.050     245  0.0370    0.00
 353             RX    0.00    5.00   10.00   14.00   32.00   41.00   48.00   52.00
 354             RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                 *

 355             KK   ON235   BASIN
 356             BA   0.002
 357             LG    0.35    0.40    6.00    0.18       0
 358             UC   0.146   0.181
 359             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 360             UA     100
                 *

 361             KK  CO240A COMBINE
 362             HC       2
                 *

 363             KK  RO240B   ROUTE
 364             RS       1    FLOW
 365             RC   0.050   0.035   0.050     465  0.0390    0.00
 366             RX    0.00    7.00   19.00   49.00   65.00   70.00   77.00   85.00
 367             RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                 *

 368             KK   ON240   BASIN
 369             BA   0.007
 370             LG    0.35    0.40    6.00    0.18       0
 371             UC   0.229   0.309
 372             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 373             UA     100
                 *
1                                         HEC-1 INPUT                                          PAGE 11

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

 374             KK  CO240B COMBINE
 375             HC       2
                 *

 376             KK  RO260A   ROUTE
 377             RS       1    FLOW
 378             RC   0.050   0.035   0.050     225  0.0360    0.00
 379             RX    0.00    7.00   15.00   26.00   29.00   34.00   42.00   50.00
 380             RY    2.00    1.00    0.00    0.00    1.00    1.00    0.50    1.00
                 *

 381             KK   ON245   BASIN
 382             BA   0.003
 383             LG    0.35    0.40    6.00    0.18       0
 384             UC   0.191   0.296
 385             UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 386             UA     100
                 *

 387             KK  RO260B   ROUTE
 388             RS       1    FLOW
 389             RC   0.050   0.035   0.050     361  0.0280    0.00
 390             RX    0.00   23.00   44.00   69.00   70.00   85.00   92.00  104.00
 391             RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                 *
```

```
393          BA   0.003
394          LG    0.35    0.40    6.00    0.18       0
395          UC   0.176   0.215
396          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
397          UA     100
             *

398          KK   CO260 COMBINE
399          HC       3
             *

400          KK  RO200A   ROUTE
401          RS       1    FLOW
402          RC   0.050   0.035   0.050     611  0.0360    0.00
403          RX    0.00    5.00   12.00   45.00   61.00   68.00   73.00   78.00
404          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

405          KK   ON265   BASIN
406          BA   0.002
407          LG    0.35    0.40    6.00    0.18       0
408          UC   0.169   0.259
409          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
410          UA     100
             *
```



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

411          KK  RO200B   ROUTE
412          RS       1    FLOW
413          RC   0.050   0.035   0.050     345  0.0290    0.00
414          RX    0.00    6.00   12.00   20.00   21.00   41.00   47.00   51.00
415          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

416          KK   ON200   BASIN
417          BA   0.006
418          LG    0.35    0.40    6.00    0.18       0
419          UC   0.207   0.260
420          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
421          UA     100
             *

422          KK   ON270   BASIN
423          BA   0.002
424          LG    0.35    0.40    6.00    0.18       0
425          UC   0.160   0.222
426          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
427          UA     100
             *

428          KK   CO200 COMBINE
429          HC       4
             *

430          KK   RO205   ROUTE
431          RS       1    FLOW
432          RC   0.050   0.035   0.050    1565  0.0370    0.00
433          RX    0.00    6.00   10.00   15.00   48.00   58.00   64.00   77.00
434          RY    4.00    2.00    1.00    0.00    0.00    1.00    2.00    4.00
             *

435          KK   ON205   BASIN
436          BA   0.020
437          LG    0.35    0.39    6.00    0.18       2
438          UC   0.299   0.372
439          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
440          UA     100
             *

441          KK   ON280   BASIN
442          BA   0.001
443          LG    0.35    0.40    6.00    0.18       0
444          UC   0.113   0.129
445          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
```

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

           447          KK   RO210   ROUTE
           448          RS       1    FLOW
           449          RC   0.050   0.035   0.050    1804  0.0382    0.00
           450          RX    0.00    2.00    4.00    5.00   10.00   12.00   14.00   18.00
           451          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                        *

           452          KK   ON210   BASIN
           453          BA   0.017
           454          LG    0.35    0.40    6.00    0.18       0
           455          UC   0.341   0.504
           456          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
           457          UA     100
                        *

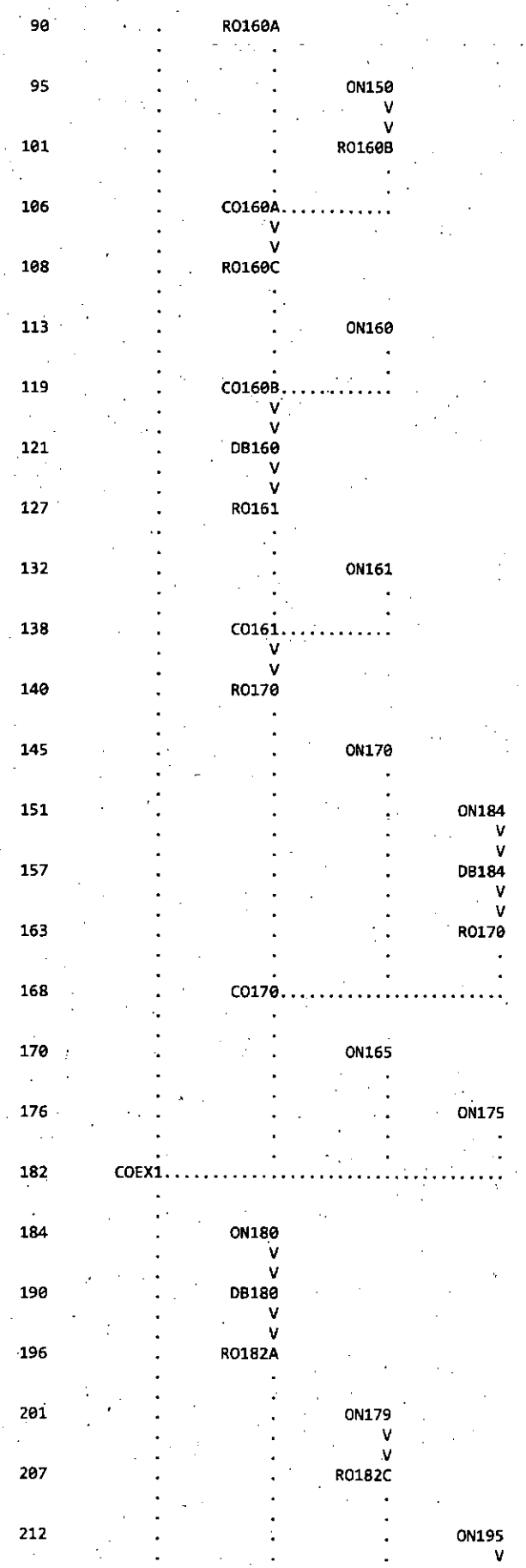
           458          KK   CO205 COMBINE
           459          HC       4
                        *
           460          ZZ
```

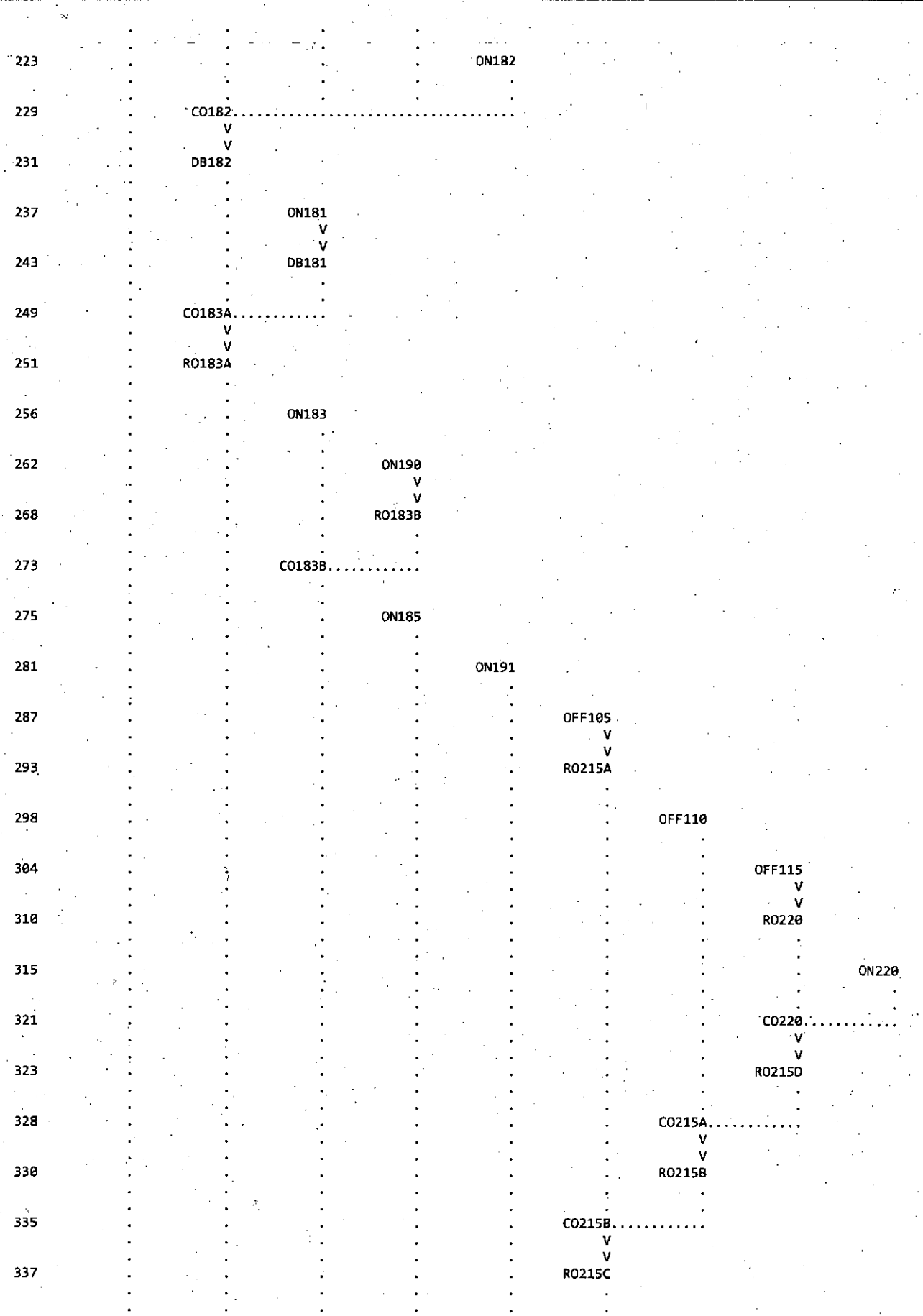

SCHEMATIC DIAGRAM OF STREAM NETWORK

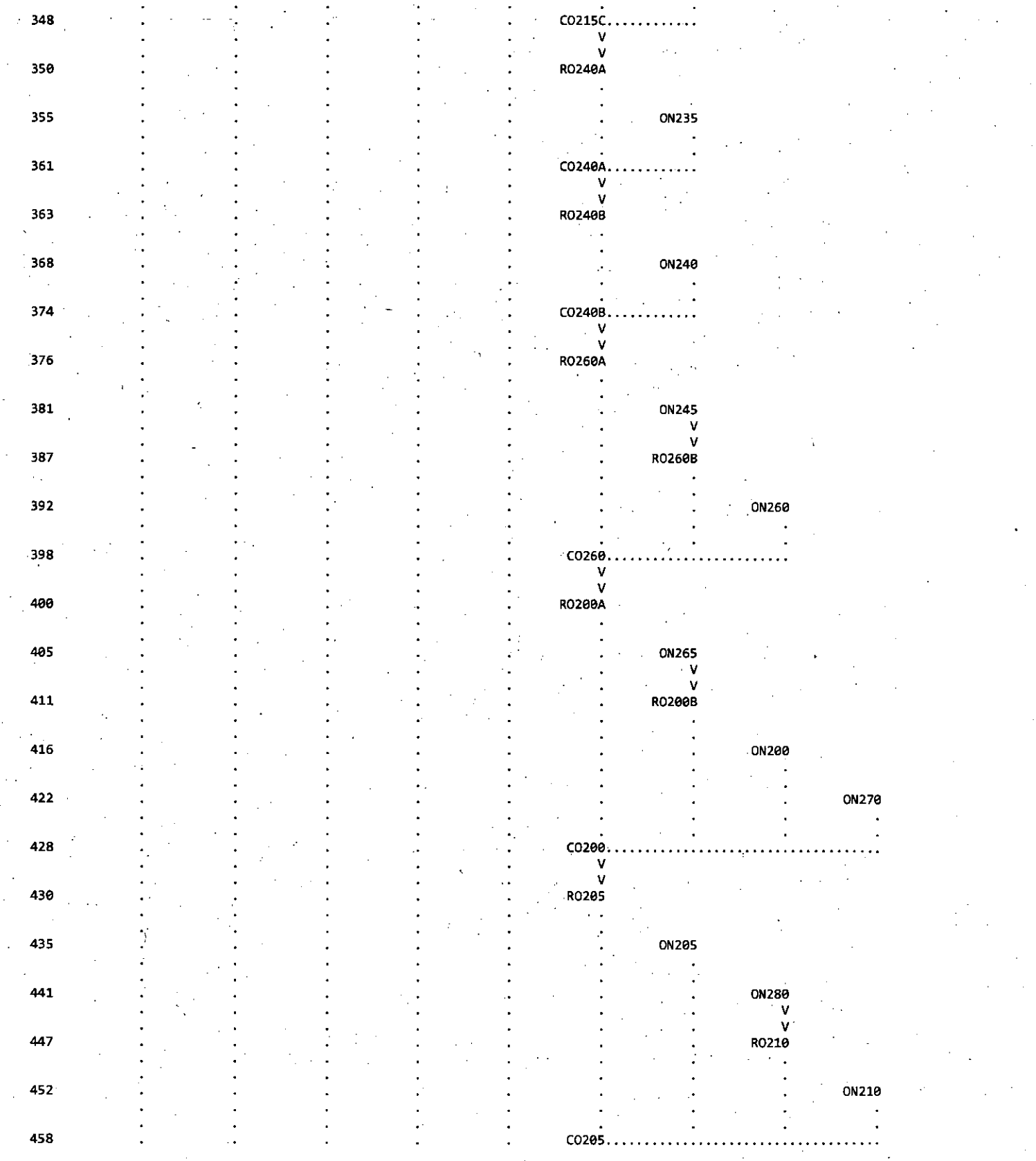
```
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    19       OFF95
             V
             V
    25      RO140A
             .
             .
    30       .      OFF100
             .           V
             .           V
    36       .      RO140B
             .           .
             .           .
    41      CO140A.......
             V
             V
    43      RO140C
             .
             .
    48       .       ON140
             .          .
             .          .
    54      CO140B.......
             V
             V
    56      RO155B
             .
             .
    61       .       ON135
             .          V
             .          V
    67       .      RO155A
             .          .
             .          .
    69      CO155A.......
             V
             V
    71      RO155C
             .
             .
    76       .       ON155
             .          .
             .          .
    82      CO155B.......
             .
             .
    84       .       ON145
```


90 RO160A
95 ON150
101 RO160B
106 CO160A
108 RO160C
113 ON160
119 CO160B
121 DB160
127 RO161
132 ON161
138 CO161
140 RO170
145 ON170
151 ON184
157 DB184
163 RO170
168 CO170
170 ON165
176 ON175
182 COEX1
184 ON180
190 DB180
196 RO182A
201 ON179
207 RO182C
212 ON195


223
ON182
229
CO182
V
V
231
DB182
237
ON181
V
V
243
DB181
249
CO183A
V
V
251
RO183A
256
ON183
262
ON190
V
V
268
RO183B
273
CO183B
275
ON185
281
ON191
287
OFF105
V
V
293
RO215A
298
OFF110
304
OFF115
V
V
310
RO220
315
ON220
321
CO220
V
V
323
RO215D
328
CO215A
V
V
330
RO215B
335
CO215B
V
V
337
RO215C



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

* *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* JUN 1998 *

* *

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* *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

* RUN DATE 19FEB17 TIME 11:22:29 * * (916) 756-1104 *

Flood Control District of Maricopa County
STORYROCK PH1C PROP - STORYROCK PHASE 1C PROP CONDITION
10 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
02/19/2017

```
 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
                  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
```

*** ***

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* *

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

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


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


          **************
          *            *
 157 KK   *    DB184   *      STORAGE
          *            *
          **************

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


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


          **************
          *            *
 190 KK   *    DB180   *      STORAGE
          *            *
          **************

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


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


          **************
          *            *
 231 KK   *    DB182   *      STORAGE
          *            *
          **************

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


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


          **************
          *            *
 243 KK   *    DB181   *      STORAGE
          *            *
          **************

 244 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

                                      PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD        BASIN    MAXIMUM     TIME OF
         OPERATION        STATION     FLOW     PEAK                                              AREA     STAGE     MAX STAGE
```

	HYDROGRAPH AT						
+	OFF9S	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	12.	4.25	1.	0.	0.	0.02
	2 COMBINED AT						
+	CO140B	52.	4.33	7.	2.	1.	0.09
	ROUTED TO						
+	RO155B	49.	4.42	7.	2.	1.	0.09
	HYDROGRAPH AT						
+	ON135	7.	4.17	1.	0.	0.	0.01
	ROUTED TO						
+	RO155A	7.	4.17	1.	0.	0.	0.01
	2 COMBINED AT						
+	CO155A	53.	4.42	8.	2.	1.	0.10
	ROUTED TO						
+	RO155C	52.	4.42	8.	2.	1.	0.10
	HYDROGRAPH AT						
+	ON155	17.	4.17	2.	0.	0.	0.02
	2 COMBINED AT						
+	CO155B	61.	4.42	9.	2.	1.	0.12
	HYDROGRAPH AT						
+	ON145	11.	4.17	1.	0.	0.	0.01
	ROUTED TO						
+	RO160A	11.	4.25	1.	0.	0.	0.01
	HYDROGRAPH AT						
+	ON150	7.	4.17	1.	0.	0.	0.01
	ROUTED TO						
+	RO160B	7.	4.17	1.	0.	0.	0.01
	2 COMBINED AT						
+	CO160A	17.	4.25	2.	0.	0.	0.02
	ROUTED TO						
+	RO160C	17.	4.25	2.	0.	0.	0.02
	HYDROGRAPH AT						
+	ON160	11.	4.25	2.	0.	0.	0.02
	2 COMBINED AT						
+	CO160B	27.	4.25	4.	1.	0.	0.04
	ROUTED TO						
+	DB160	18.	4.50	4.	1.	0.	0.04
	ROUTED TO						
+	RO161	18.	4.67	4.	1.	0.	0.04
	HYDROGRAPH AT						
+	ON161	7.	4.25	1.	0.	0.	0.01

	2 COMBINED AT						
+	CO183B	11.	4.17	1.	0.	0.	0.01
	HYDROGRAPH AT						
+	ON185	2.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	ON191	9.	4.08	1.	0.	0.	0.01
	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
	ROUTED TO						
+	RO240A	93.	4.33	13.	3.	1.	0.16
	HYDROGRAPH AT						
+	ON235	2.	4.08	0.	0.	0.	0.00
	2 COMBINED AT						
+	CO240A	94.	4.33	13.	3.	1.	0.16
	ROUTED TO						
+	RO240B	94.	4.33	13.	3.	1.	0.16
	HYDROGRAPH AT						
+	ON240	6.	4.17	1.	0.	0.	0.01
	2 COMBINED AT						
+	CO240B	97.	4.33	13.	3.	1.	0.17
	ROUTED TO						
+	RO260A	97.	4.33	13.	3.	1.	0.17
	HYDROGRAPH AT						
+	ON245	3.	4.08	0.	0.	0.	0.00
	ROUTED TO						

```
         HYDROGRAPH AT
+                         ON260         3.     4.08          0.          0.          0.       0.00

         3 COMBINED AT
+                         CO260       100.     4.33         14.          3.          1.       0.18

         ROUTED TO
+                        RO200A        99.     4.42         14.          3.          1.       0.18

         HYDROGRAPH AT
+                         ON265         2.     4.08          0.          0.          0.       0.00

         ROUTED TO
+                        RO200B         2.     4.17          0.          0.          0.       0.00

         HYDROGRAPH AT
+                         ON200         6.     4.08          0.          0.          0.       0.01

         HYDROGRAPH AT
+                         ON270         2.     4.08          0.          0.          0.       0.00

         4 COMBINED AT
+                         CO200       104.     4.33         14.          4.          1.       0.19

         ROUTED TO
+                         RO205       102.     4.42         14.          4.          1.       0.19

         HYDROGRAPH AT
+                         ON205        16.     4.17          2.          0.          0.       0.02

         HYDROGRAPH AT
+                         ON280         1.     4.00          0.          0.          0.       0.00

         ROUTED TO
+                         RO210         1.     4.17          0.          0.          0.       0.00

         HYDROGRAPH AT
+                         ON210        11.     4.25          1.          0.          0.       0.02

         4 COMBINED AT
+                         CO205       120.     4.42         17.          4.          1.       0.23
1
                                            SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                                (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                               INTERPOLATED TO
                                                                            COMPUTATION INTERVAL
           ISTAQ    ELEMENT       DT       PEAK    TIME TO    VOLUME       DT       PEAK    TIME TO     VOLUME
                                                     PEAK                                      PEAK

                                 (MIN)     (CFS)     (MIN)     (IN)      (MIN)     (CFS)     (MIN)      (IN)

            FOR STORM = 1  STORM AREA (SQ MI) =       0.00
              RO155A  MANE        0.17      6.74    250.24      0.73      5.00      6.71    250.00      0.73

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3094E+00 EXCESS=0.0000E+00 OUTFLOW=0.3094E+00 BASIN STORAGE=0.3251E-18 PERCENT ERROR=   0.0

            FOR STORM = 2  STORM AREA (SQ MI) =       0.50
              RO155A  MANE        0.15      6.68    250.29      0.72      5.00      6.64    250.00      0.72

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3059E+00 EXCESS=0.0000E+00 OUTFLOW=0.3059E+00 BASIN STORAGE=0.3257E-18 PERCENT ERROR=   0.0


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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   19FEB17  TIME  11:22:34   *
*                                       *
*****************************************
```

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

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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 PH1C PROP - STORYROCK PHASE 1C PROP CONDITION
  3       ID       100 YEAR
  4       ID       6 Hour  Storm
  5       ID       Unit Hydrograph: Clark
  6       ID       Storm: Multiple
  7       ID       02/19/2017
          *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       KK   OFF95   BASIN
 20       BA   0.064
 21       LG    0.35    0.40   6.00   0.18      0
 22       UC   0.341   0.422
 23       UA       0     3.0    5.0    8.0   12.0   20.0   43.0   75.0   90.0   96.0
 24       UA     100
          *

 25       KK  RO140A   ROUTE
 26       RS       1    FLOW
 27       RC   0.050   0.035  0.050    333 0.0270   0.00
 28       RX    0.00   27.00  30.00  34.00  34.20  40.00  47.00  82.00
 29       RY    3.00    2.00   1.00   0.00   0.00   1.00   2.00   3.00
          *

 30       KK  OFF100   BASIN
 31       BA   0.011
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 34          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 35          UA     100
             *

 36          KK  RO140B   ROUTE
 37          RS       1    FLOW
 38          RC   0.050   0.035   0.050     626  0.0340    0.00
 39          RX    0.00    7.00    8.00   11.00   11.20   14.00   16.00   31.00
 40          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
1                                    HEC-1 INPUT                                    PAGE  2

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

 41          KK  CO140A COMBINE
 42          HC       2
             *

 43          KK  RO140C   ROUTE
 44          RS       1    FLOW
 45          RC   0.050   0.035   0.050    1210  0.0320    0.00
 46          RX    0.00    3.00    6.00   11.00   11.20   17.00   23.00   48.00
 47          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 48          KK   ON140   BASIN
 49          BA   0.017
 50          LG    0.34    0.39    6.00    0.18       4
 51          UC   0.249   0.356
 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  CO140B COMBINE
 55          HC       2
             *

 56          KK  RO155B   ROUTE
 57          RS       1    FLOW
 58          RC   0.050   0.035   0.050     910  0.0350    0.00
 59          RX    0.00   16.00   61.00   76.00   90.00  121.00  200.00  226.00
 60          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *

 61          KK   ON135   BASIN
 62          BA   0.008
 63          LG    0.35    0.40    6.00    0.18       0
 64          UC   0.188   0.251
 65          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 66          UA     100
             *

 67          KK  RO155A   ROUTE
 68          RK     837  0.2900   0.013            CIRC   2.000
             *

 69          KK  CO155A COMBINE
 70          HC       2
             *

 71          KK  RO155C   ROUTE
 72          RS       1    FLOW
 73          RC   0.050   0.035   0.050     392  0.0330    0.00
 74          RX    0.00   14.00   22.00   30.00   42.00   54.00   68.00   90.00
 75          RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
             *
1                                    HEC-1 INPUT                                    PAGE  3

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

*76          KK   ON155   BASIN
 77          BA   0.017
 78          LG    0.33    0.34    6.00    0.19      11
 79          UC   0.195   0.222
 80          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
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 82          KK  CO155B COMBINE
 83          HC       2
             *

 84          KK   ON145   BASIN
 85          BA   0.014
 86          LG    0.31    0.38    6.00    0.19       9
 87          UC   0.223   0.320
 88          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 89          UA     100
             *

 90          KK  RO160A   ROUTE
 91          RS       1    FLOW
 92          RC   0.050   0.035   0.050     581  0.0280    0.00
 93          RX    0.00    6.00   12.00   18.00   22.00   28.00   34.00   40.00
 94          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

 95          KK   ON150   BASIN
 96          BA   0.007
 97          LG    0.35    0.40    6.00    0.18       0
 98          UC   0.166   0.196
 99          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
100          UA     100
             *

101          KK  RO160B   ROUTE
102          RS       1    FLOW
103          RC   0.050   0.035   0.050     800  0.0300    0.00
104          RX    0.00    6.00   10.00   14.00   16.00   18.00   22.00   28.00
105          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

106          KK  CO160A COMBINE
107          HC       2
             *

108          KK  RO160C   ROUTE
109          RS       1    FLOW
110          RC   0.050   0.035   0.050     794  0.0300    0.00
111          RX    0.00    6.00   17.00   22.00   28.00   32.00   36.00   48.00
112          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

113          KK   ON160   BASIN
114          BA   0.020
115          LG    0.33    0.33    6.00    0.20      14
116          UC   0.284   0.573
117          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
118          UA     100
             *

119          KK  CO160B COMBINE
120          HC       2
             *

121          KK   DB160 STORAGE
122          KO
123          RS       1    STOR
124          SV            0.01    0.05    0.11    0.16    0.27    0.45    0.45
125          SQ            3.00    7.00    9.00   14.00   17.00   20.00   65.00
126          SE            1.00    2.00    3.00    4.00    5.00    6.00    6.24
             *

127          KK  RO161   ROUTE
128          RS       1    FLOW
129          RC   0.050   0.035   0.050    1451  0.0312    0.00
130          RX    0.00   12.00   20.00   29.00   36.00   40.00   50.00   54.00
131          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *
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 134          LG    0.34    0.37    6.00    0.18       5
 135          UC   0.223   0.388
 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   CO161 COMBINE
 139          HC       2
              *

 140          KK   RO170   ROUTE
 141          RS       1    FLOW
 142          RC   0.050   0.035   0.050     585  0.0310    0.00
 143          RX    0.00    1.00    3.00    4.00   10.00   11.00   15.00   20.00
 144          RY    2.00    2.00    2.00    0.00    0.00    2.00    2.00    2.00
              *

 145          KK   ON170   BASIN
 146          BA   0.005
 147          LG    0.35    0.40    6.00    0.18       0
 148          UC   0.165   0.213
 149          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 150          UA     100
              *
1                                      HEC-1 INPUT                                    PAGE  5

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

 151          KK   ON184   BASIN
 152          BA   0.009
 153          LG    0.30    0.25    6.00    0.22      27
 154          UC   0.129   0.141
 155          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 156          UA     100
              *

 157          KK   DB184 STORAGE
 158          KO
 159          RS       1    STOR
 160          SV            0.12    0.24    0.36    0.48    0.60    0.72    0.72
 161          SQ                    1.00    1.00    1.00    2.00    2.00   10.00
 162          SE            0.50    1.00    1.50    2.00    2.50    2.98    3.00
              *

 163          KK   RO170   ROUTE
 164          RS       1    FLOW
 165          RC   0.050   0.035   0.050     585  0.0310    0.00
 166          RX    0.00    1.00    3.00    4.00   10.00   11.00   15.00   20.00
 167          RY    2.00    2.00    2.00    0.00    0.00    2.00    2.00    2.00
              *

 168          KK   CO170 COMBINE
 169          HC       3
              *

 170          KK   ON165   BASIN
 171          BA   0.008
 172          LG    0.31    0.27    6.00    0.21      24
 173          UC   0.188   0.391
 174          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
 175          UA     100
              *

 176          KK   ON175   BASIN
 177          BA   0.002
 178          LG    0.30    0.25    6.00    0.17      17
 179          UC   0.067   0.067
 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   COEX1 COMBINE
 183          HC       4
              *

 184          KK   ON180   BASIN
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187          UC   0.124   0.155
188          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
189          UA     100
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

190          KK   DB180 STORAGE
191          KO
192          RS       1    STOR
193          SV            0.06    0.14    0.20    0.26    0.34    0.39    0.40
194          SQ            1.00    3.00    4.00    5.00    5.00    6.00    6.00
195          SE            0.50    1.00    1.50    2.00    2.50    2.95    3.00
             *

196          KK  RO182A   ROUTE
197          RS       1    FLOW
198          RC   0.050   0.035   0.050     555  0.0340    0.00
199          RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
200          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

201          KK   ON179   BASIN
202          BA   0.002
203          LG    0.35    0.40    6.00    0.18       0
204          UC   0.113   0.135
205          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
206          UA     100
             *

207          KK  RO182C   ROUTE
208          RS       1    FLOW
209          RC   0.050   0.035   0.050     952  0.0340    0.00
210          RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
211          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

212          KK   ON195   BASIN
213          BA   0.009
214          LG    0.35    0.40    6.00    0.18       0
215          UC   0.204   0.287
216          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
217          UA     100
             *

218          KK  RO182B   ROUTE
219          RS       1    FLOW
220          RC   0.050   0.035   0.050    1027  0.0340    0.00
221          RX    0.00   16.00   24.00   28.00   29.00   36.00   58.00   95.00
222          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

223          KK   ON182   BASIN
224          BA   0.009
225          LG    0.32    0.32    6.00    0.20      15
226          UC   0.153   0.179
227          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
228          UA     100
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

229          KK   CO182 COMBINE
230          HC       4
             *

231          KK   DB182 STORAGE
232          KO
233          RS       1    STOR
234          SV            0.01    0.02    0.04    0.05    0.13    0.18    0.26    0.34
235          SQ            2.00    4.00    7.00    9.00   11.00   13.00   14.00   44.00
236          SE            0.50    1.00    1.50    2.00    2.50    3.00    3.50    4.00
             *
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238          BA   0.004
239          LG    0.31    0.29    6.00    0.21      20
240          UC   0.112   0.148
241          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
242          UA     100
             *

243          KK   DB181 STORAGE
244          KO
245          RS       1    STOR
246          SV            0.06    0.12    0.20    0.28    0.37    0.46
247          SQ            1.00    1.00    2.00    2.00    2.00    2.00
248          SE            0.50    1.00    1.50    2.00    2.50    3.00
             *

249          KK   CO183A COMBINE
250          HC       2
             *

251          KK   RO183A   ROUTE
252          RS       1     FLOW
253          RC   0.050   0.035   0.050    1262  0.0360    0.00
254          RX    0.00   10.00   18.00   22.00   29.00   34.00   38.00   43.00
255          RY    2.00    1.50    1.00    0.00    0.00    1.00    1.50    2.00
             *

256          KK   ON183   BASIN
257          BA   0.007
258          LG    0.33    0.34    6.00    0.18       9
259          UC   0.196   0.359
260          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
261          UA     100
             *

262          KK   ON190   BASIN
263          BA   0.006
264          LG    0.32    0.30    6.00    0.20      18
265          UC   0.151   0.241
266          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
267          UA     100
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

268          KK   RO183B   ROUTE
269          RS       1     FLOW
270          RC   0.050   0.035   0.050     621  0.0360    0.00
271          RX    0.00   10.00   18.00   22.00   29.00   34.00   38.00   43.00
272          RY    2.00    1.50    1.00    0.00    0.00    1.00    1.50    2.00
             *

273          KK   CO183B COMBINE
274          HC       2
             *

275          KK   ON185   BASIN
276          BA   0.002
277          LG    0.35    0.40    6.00    0.18       0
278          UC   0.112   0.134
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   ON191   BASIN
282          BA   0.006
283          LG    0.31    0.27    6.00    0.18      17
284          UC   0.109   0.121
285          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
286          UA     100
             *

287          KK   OFF105   BASIN
288          BA   0.085
289          LG    0.35    0.40    6.00    0.18       0
290          UC   0.336   0.402
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                *
  293           KK  RO215A   ROUTE
  294           RS       1    FLOW
  295           RC   0.050   0.035   0.050     975  0.0360    0.00
  296           RX    0.00    9.00   21.00   25.00   32.00   36.00   70.00   90.00
  297           RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *
  298           KK  OFF110   BASIN
  299           BA   0.037
  300           LG    0.35    0.40    6.00    0.18       0
  301           UC   0.268   0.353
  302           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  303           UA     100
                *
1                                        HEC-1 INPUT                                        PAGE  9

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

  304           KK  OFF115   BASIN
  305           BA   0.007
  306           LG    0.35    0.40    6.00    0.18       0
  307           UC   0.142   0.140
  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   RO220   ROUTE
  311           RS       1    FLOW
  312           RC   0.050   0.035   0.050     310  0.0420    0.00
  313           RX    0.00    8.00   15.00   21.00   21.10   25.00   30.00   36.00
  314           RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *
  315           KK   ON220   BASIN
  316           BA   0.003
  317           LG    0.35    0.40    6.00    0.18       0
  318           UC   0.139   0.194
  319           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  320           UA     100
                *
  321           KK   CO220 COMBINE
  322           HC       2
                *
  323           KK  RO215D   ROUTE
  324           RS       1    FLOW
  325           RC   0.050   0.035   0.050     364  0.0300    0.00
  326           RX    0.00    5.00    8.00   11.00   11.10   14.00   17.00   24.00
  327           RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *
  328           KK  CO215A COMBINE
  329           HC       2
                *
  330           KK  RO215B   ROUTE
  331           RS       1    FLOW
  332           RC   0.050   0.035   0.050     800  0.0340    0.00
  333           RX    0.00    6.00   10.00   13.00   19.00   21.00   26.00   62.00
  334           RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *
  335           KK  CO215B COMBINE
  336           HC       2
                *
1                                        HEC-1 INPUT                                        PAGE 10

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

  337           KK  RO215C   ROUTE
  338           RS       1    FLOW
  339           RC   0.050   0.035   0.050     445  0.0340    0.00
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                *
  342           KK   ON215   BASIN
  343           BA   0.030
  344           LG    0.35    0.40    6.00    0.18       0
  345           UC   0.218   0.202
  346           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  347           UA     100
                *

  348           KK  CO215C COMBINE
  349           HC       2
                *

  350           KK  RO240A   ROUTE
  351           RS       1    FLOW
  352           RC   0.050   0.035   0.050     245  0.0370    0.00
  353           RX    0.00    5.00   10.00   14.00   32.00   41.00   48.00   52.00
  354           RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *

  355           KK   ON235   BASIN
  356           BA   0.002
  357           LG    0.35    0.40    6.00    0.18       0
  358           UC   0.110   0.132
  359           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  360           UA     100
                *

  361           KK  CO240A COMBINE
  362           HC       2
                *

  363           KK  RO240B   ROUTE
  364           RS       1    FLOW
  365           RC   0.050   0.035   0.050     465  0.0390    0.00
  366           RX    0.00    7.00   19.00   49.00   65.00   70.00   77.00   85.00
  367           RY    2.00    0.50    1.00    0.00    0.00    1.00    0.00    2.00
                *

  368           KK   ON240   BASIN
  369           BA   0.007
  370           LG    0.35    0.40    6.00    0.18       0
  371           UC   0.172   0.225
  372           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  373           UA     100
                *
1                                        HEC-1 INPUT                                        PAGE 11

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

  374           KK  CO240B COMBINE
  375           HC       2
                *

  376           KK  RO260A   ROUTE
  377           RS       1    FLOW
  378           RC   0.050   0.035   0.050     225  0.0360    0.00
  379           RX    0.00    7.00   15.00   26.00   29.00   34.00   42.00   50.00
  380           RY    2.00    1.00    0.00    0.00    1.00    1.00    0.50    1.00
                *

  381           KK   ON245   BASIN
  382           BA   0.003
  383           LG    0.35    0.40    6.00    0.18       0
  384           UC   0.143   0.216
  385           UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
  386           UA     100
                *

  387           KK  RO260B   ROUTE
  388           RS       1    FLOW
  389           RC   0.050   0.035   0.050     361  0.0280    0.00
  390           RX    0.00   23.00   44.00   69.00   70.00   85.00   92.00  104.00
  391           RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                *
```

```
393          BA   0.003
394          LG    0.35    0.40    6.00    0.18       0
395          UC   0.133   0.157
396          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
397          UA     100
             *

398          KK   CO260 COMBINE
399          HC       3
             *

400          KK  RO200A   ROUTE
401          RS       1    FLOW
402          RC   0.050   0.035   0.050     611  0.0360    0.00
403          RX    0.00    5.00   12.00   45.00   61.00   68.00   73.00   78.00
404          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

405          KK   ON265   BASIN
406          BA   0.002
407          LG    0.35    0.40    6.00    0.18       0
408          UC   0.127   0.189
409          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
410          UA     100
             *
1                                        HEC-1 INPUT                                    PAGE 12

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

411          KK  RO200B   ROUTE
412          RS       1    FLOW
413          RC   0.050   0.035   0.050     345  0.0290    0.00
414          RX    0.00    6.00   12.00   20.00   21.00   41.00   47.00   51.00
415          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
             *

416          KK   ON200   BASIN
417          BA   0.006
418          LG    0.35    0.40    6.00    0.18       0
419          UC   0.155   0.190
420          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
421          UA     100
             *

422          KK   ON270   BASIN
423          BA   0.002
424          LG    0.35    0.40    6.00    0.18       0
425          UC   0.121   0.162
426          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
427          UA     100
             *

428          KK   CO200 COMBINE
429          HC       4
             *

430          KK   RO205   ROUTE
431          RS       1    FLOW
432          RC   0.050   0.035   0.050    1565  0.0370    0.00
433          RX    0.00    6.00   10.00   15.00   48.00   58.00   64.00   77.00
434          RY    4.00    2.00    1.00    0.00    0.00    1.00    2.00    4.00
             *

435          KK   ON205   BASIN
436          BA   0.020
437          LG    0.35    0.39    6.00    0.18       2
438          UC   0.226   0.272
439          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
440          UA     100
             *

441          KK   ON280   BASIN
442          BA   0.001
443          LG    0.35    0.40    6.00    0.18       0
444          UC   0.085   0.094
445          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
```

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

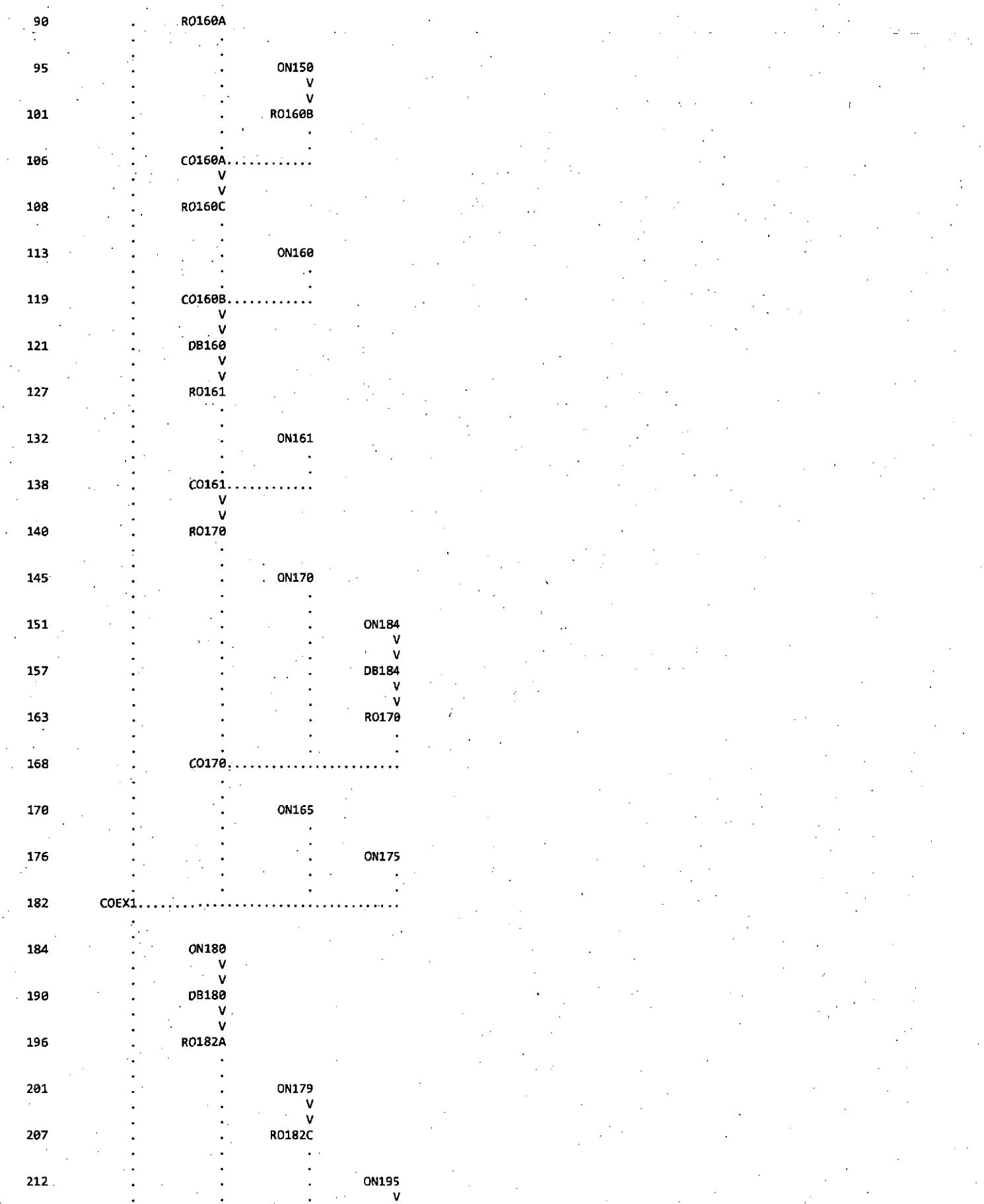
       447          KK   RO210   ROUTE
       448          RS      1    FLOW
       449          RC   0.050   0.035   0.050    1804  0.0382    0.00
       450          RX    0.00    2.00    4.00    5.00   10.00   12.00   14.00   18.00
       451          RY    3.00    2.00    1.00    0.00    0.00    1.00    2.00    3.00
                    *
       452          KK   ON210   BASIN
       453          BA   0.017
       454          LG    0.35    0.40    6.00    0.18       0
       455          UC   0.256   0.367
       456          UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
       457          UA     100
                    *
       458          KK   CO205 COMBINE
       459          HC       4
                    *
       460          ZZ
```

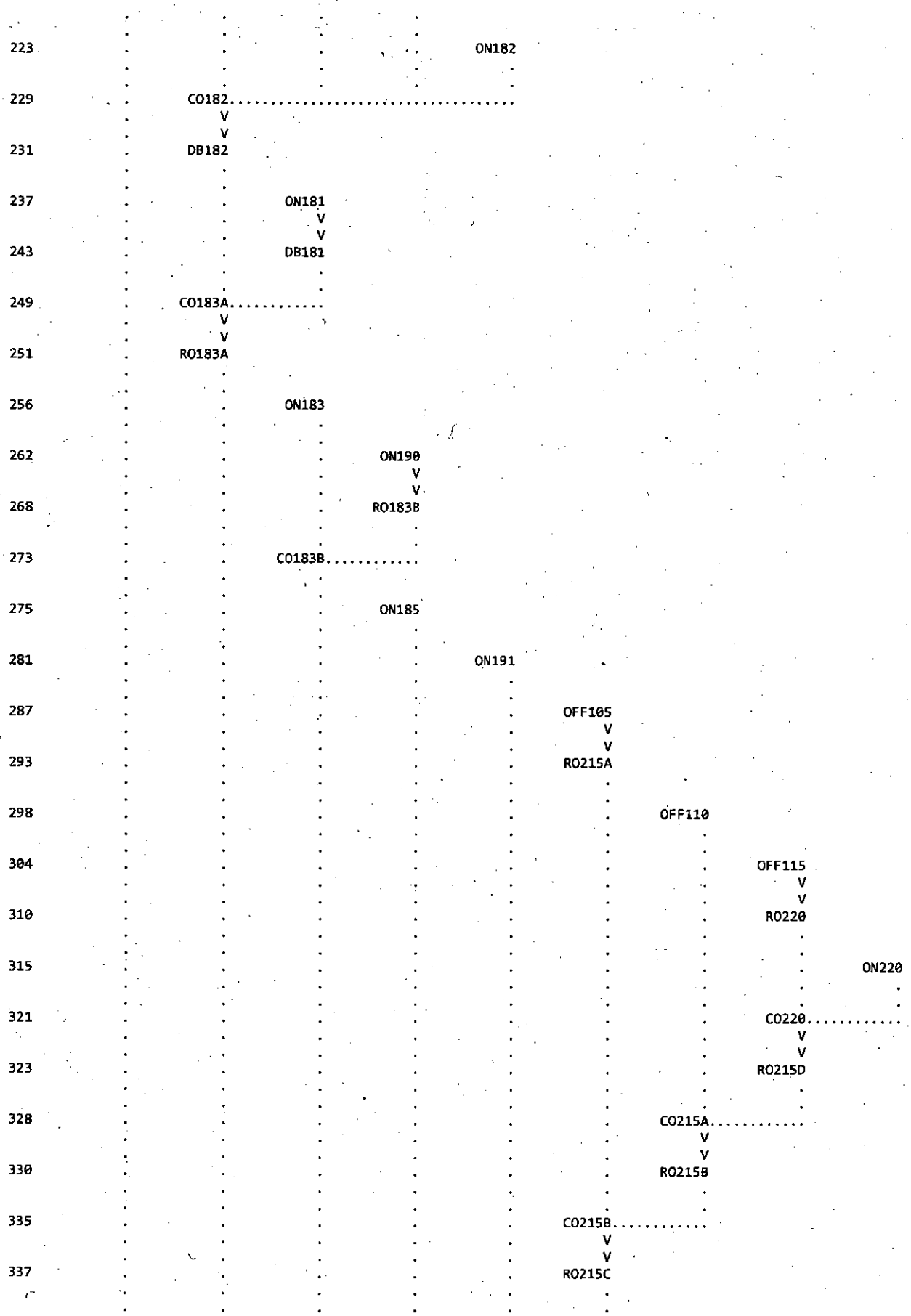
1

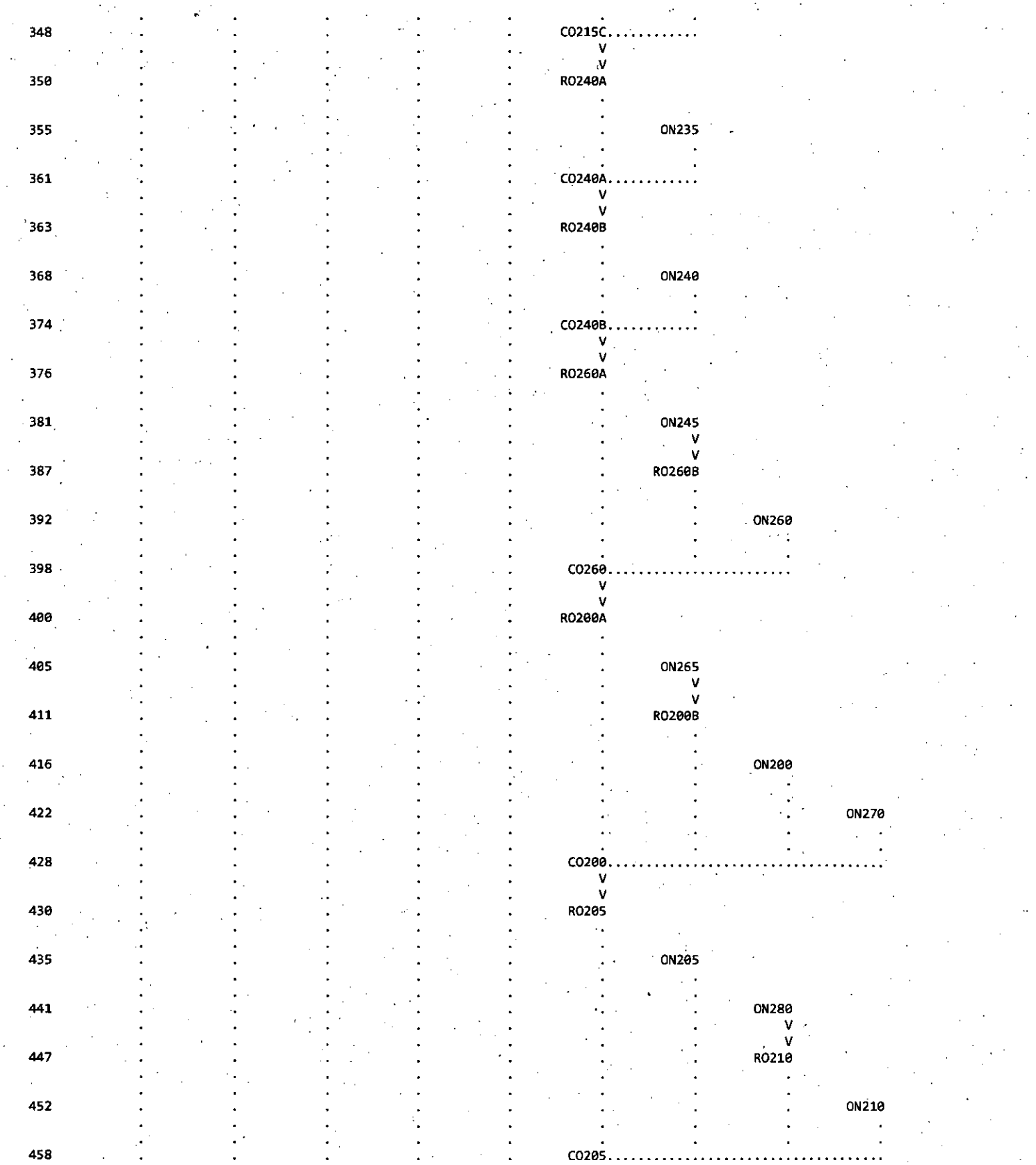
SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   19       OFF95
              V
              V
   25       RO140A
              .
              .
   30         .       OFF100
              .          V
              .          V
   36         .       RO140B
              .          .
              .          .
   41       CO140A.............
              V
              V
   43       RO140C
              .
              .
   48         .        ON140
              .          .
              .          .
   54       CO140B.............
              V
              V
   56       RO155B
              .
              .
   61         .        ON135
              .          V
              .          V
   67         .       RO155A
              .          .
              .          .
   69       CO155A.............
              V
              V
   71       RO155C
              .
              .
   76         .        ON155
              .          .
              .          .
   82       CO155B.............
              .
              .
   84         .        ON145
```


90 RO160A
95 ON150
101 RO160B
106 CO160A
108 RO160C
113 ON160
119 CO160B
121 DB160
127 RO161
132 ON161
138 CO161
140 RO170
145 ON170
151 ON184
157 DB184
163 RO170
168 CO170
170 ON165
176 ON175
182 COEX1
184 ON180
190 DB180
196 RO182A
201 ON179
207 RO182C
212 ON195


223
ON182
229
CO182
V
V
231
DB182
237
ON181
V
V
243
DB181
249
CO183A
V
V
251
RO183A
256
ON183
262
ON190
V
V
268
RO183B
273
CO183B
275
ON185
281
ON191
287
OFF105
V
V
293
RO215A
298
OFF110
304
OFF115
V
V
310
RO220
315
ON220
321
CO220
V
V
323
RO215D
328
CO215A
V
V
330
RO215B
335
CO215B
V
V
337
RO215C



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

* *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* JUN 1998 *

* *

****

* *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

* RUN DATE 19FEB17 TIME 11:22:34 * * (916) 756-1104 *

Flood Control District of Maricopa County
STORYROCK PH1C PROP - STORYROCK PHASE 1C PROP CONDITION
100 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple
02/19/2017

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
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								

*** ***

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* *

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

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


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


          **************
          *            *
 157 KK   *     DB184  *      STORAGE
          *            *
          **************

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


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


          **************
          *            *
 190 KK   *     DB180  *      STORAGE
          *            *
          **************

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


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


          **************
          *            *
 231 KK   *     DB182  *      STORAGE
          *            *
          **************

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

WARNING --- ROUTED OUTFLOW (     44.) IS GREATER THAN MAXIMUM OUTFLOW (     44.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (     44.) IS GREATER THAN MAXIMUM OUTFLOW (     44.) IN STORAGE-OUTFLOW TABLE


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


          **************
          *            *
 243 KK   *     DB181  *      STORAGE
          *            *
          **************

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


RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND

	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	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	27.	4.17	3.	1.	0.	0.02		
+	2 COMBINED AT	CO140B	131.	4.25	15.	4.	1.	0.09		
+	ROUTED TO	RO155B	124.	4.33	15.	4.	1.	0.09		
+	HYDROGRAPH AT	ON135	16.	4.08	1.	0.	0.	0.01		
+	ROUTED TO	RO155A	15.	4.08	1.	0.	0.	0.01		
+	2 COMBINED AT	CO155A	133.	4.33	17.	4.	1.	0.10		
+	ROUTED TO	RO155C	134.	4.33	17.	4.	1.	0.10		
+	HYDROGRAPH AT	ON155	37.	4.08	3.	1.	0.	0.02		
+	2 COMBINED AT	CO155B	154.	4.25	20.	5.	2.	0.12		
+	HYDROGRAPH AT	ON145	24.	4.17	3.	1.	0.	0.01		
+	ROUTED TO	RO160A	24.	4.17	3.	1.	0.	0.01		
+	HYDROGRAPH AT	ON150	16.	4.08	1.	0.	0.	0.01		
+	ROUTED TO	RO160B	15.	4.17	1.	0.	0.	0.01		
+	2 COMBINED AT	CO160A	39.	4.17	4.	1.	0.	0.02		
+	ROUTED TO	RO160C	38.	4.17	4.	1.	0.	0.02		
+	HYDROGRAPH AT	ON160	24.	4.25	4.	1.	0.	0.02		
+	2 COMBINED AT	CO160B	62.	4.17	8.	2.	1.	0.04		
+	ROUTED TO	DB160	62.	4.17	8.	2.	1.	0.04		
	ROUTED TO									

	HYDROGRAPH AT							
+		ON161	16.	4.17	2.	0.	0.	0.01
	2 COMBINED AT							
+		CO161	70.	4.25	9.	2.	1.	0.05
	ROUTED TO							
+		RO170	69.	4.33	9.	2.	1.	0.05
	HYDROGRAPH AT							
+		ON170	11.	4.08	1.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON184	23.	4.00	2.	0.	0.	0.01
	ROUTED TO							
+		DB184	10.	4.25	1.	0.	0.	0.01
	ROUTED TO							
+		RO170	9.	4.33	1.	0.	0.	0.01
	3 COMBINED AT							
+		CO170	83.	4.33	11.	3.	1.	0.06
	HYDROGRAPH AT							
+		ON165	13.	4.17	2.	0.	0.	0.01
	HYDROGRAPH AT							
+		ON175	7.	4.00	0.	0.	0.	0.00
	4 COMBINED AT							
+		COEX1	245.	4.25	33.	8.	3.	0.19
	HYDROGRAPH AT							
+		ON180	12.	4.00	1.	0.	0.	0.00
	ROUTED TO							
+		DB180	5.	4.25	1.	0.	0.	0.00
	ROUTED TO							
+		RO182A	5.	4.33	1.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON179	5.	4.00	0.	0.	0.	0.00
	ROUTED TO							
+		RO182C	5.	4.08	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		ON195	16.	4.08	2.	0.	0.	0.01
	ROUTED TO							
+		RO182B	16.	4.17	2.	0.	0.	0.01
	HYDROGRAPH AT							
+		ON182	22.	4.08	2.	0.	0.	0.01
	4 COMBINED AT							
+		CO182	43.	4.08	5.	1.	0.	0.02
	ROUTED TO							
+		DB182	44.	4.17	5.	1.	0.	0.02
	HYDROGRAPH AT							
+		ON181	10.	4.00	1.	0.	0.	0.00
	ROUTED TO							
+		DB181	2.	4.08	1.	0.	0.	0.00
	2 COMBINED AT							
+		CO183A	46.	4.17	5.	1.	0.	0.03
	ROUTED TO							
+		RO183A	43.	4.25	5.	1.	0.	0.03
	HYDROGRAPH AT							
+		ON183	12.	4.17	1.	0.	0.	0.01

ROUTED TO							
+	RO260B	6.	4.08	1.	0.	0.	0.00
HYDROGRAPH AT							
+	ON260	7.	4.08	1.	0.	0.	0.00
3 COMBINED AT							
+	CO260	251.	4.25	29.	7.	2.	0.18
ROUTED TO							
+	RO200A	252.	4.25	29.	7.	2.	0.18
HYDROGRAPH AT							
+	ON265	4.	4.08	0.	0.	0.	0.00
ROUTED TO							
+	RO200B	4.	4.08	0.	0.	0.	0.00
HYDROGRAPH AT							
+	ON200	13.	4.08	1.	0.	0.	0.01
HYDROGRAPH AT							
+	ON270	5.	4.00	0.	0.	0.	0.00
4 COMBINED AT							
+	CO200	264.	4.25	31.	8.	3.	0.19
ROUTED TO							
+	RO205	256.	4.33	31.	8.	3.	0.19
HYDROGRAPH AT							
+	ON205	36.	4.17	3.	1.	0.	0.02
HYDROGRAPH AT							
+	ON280	3.	4.00	0.	0.	0.	0.00
ROUTED TO							
+	RO210	2.	4.08	0.	0.	0.	0.00
HYDROGRAPH AT							
+	ON210	26.	4.17	3.	1.	0.	0.02
4 COMBINED AT							
+	CO205	308.	4.25	38.	9.	3.	0.23

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									
RO155A	MANE	0.21	15.60	245.37	1.56	5.00	15.47	245.00	1.56

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6662E+00 EXCESS=0.0000E+00 OUTFLOW=0.6662E+00 BASIN STORAGE=0.3231E-18 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50									
RO155A	MANE	0.22	15.47	245.44	1.55	5.00	15.35	245.00	1.55

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6596E+00 EXCESS=0.0000E+00 OUTFLOW=0.6595E+00 BASIN STORAGE=0.3235E-18 PERCENT ERROR= 0.0

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

Appendix C – Hydraulics

HEC-RAS Output (Existing and Proposed Conditions)

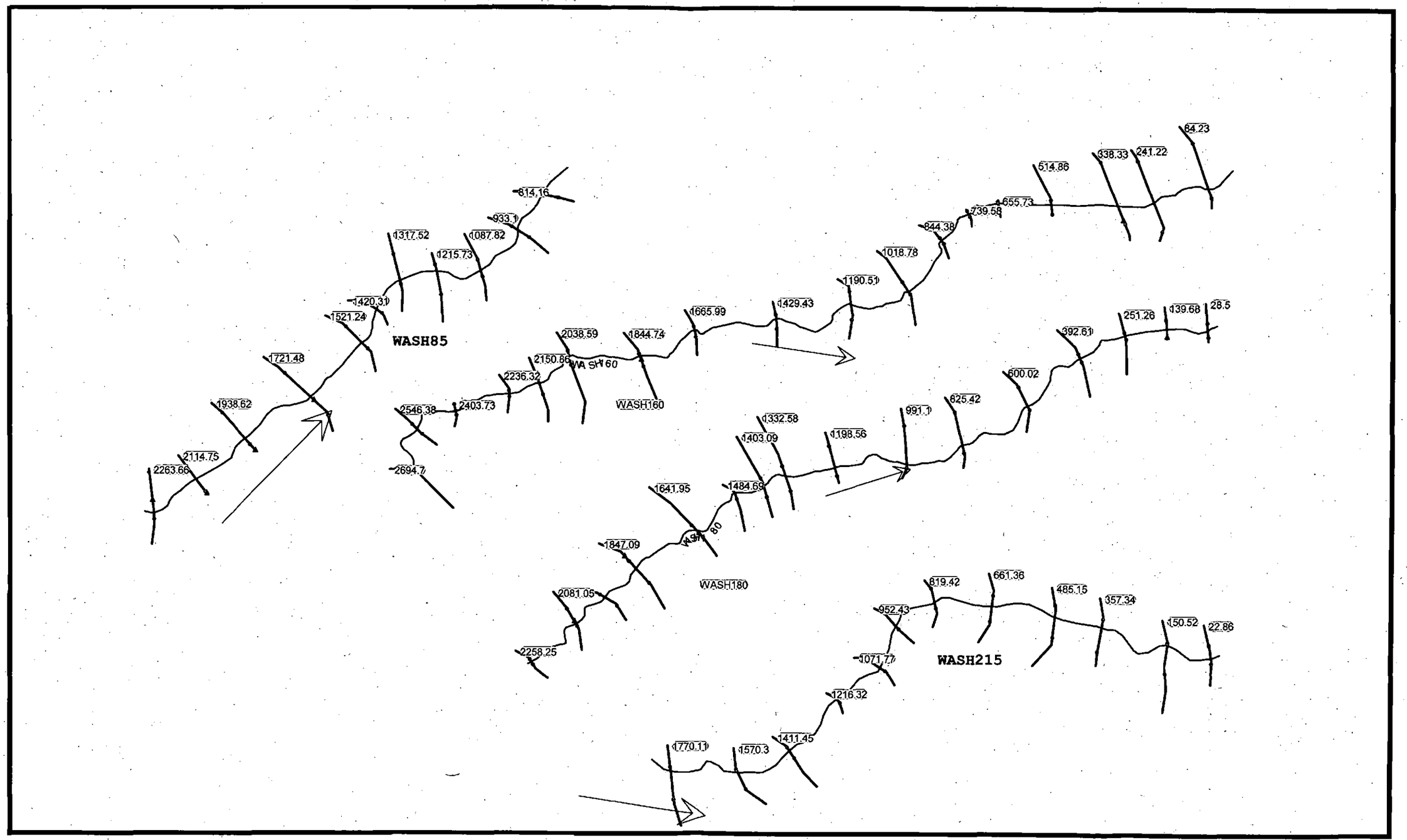
- Schematic Geometry
- Cross Sections
- Profiles
- Summary Table

HY-8 Output:

- Preliminary Culvert Calculations

First Flush Spillway/Dissipation Basin Design:

HEC-RAS Existing Condition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933.1
1317.52
1087.82
1215.73
1420.31
1521.24
WASH85
1721.48
1938.62
2114.75
2263.66
2038.59
2150.86
2236.32
2403.73
2546.38
2694.7
1844.74
WA SH60
WASH160
1665.99
1429.43
1190.51
1018.78
844.38
739.58
655.73
514.86
338.33
241.22
84.23
1332.58
1403.09
1198.56
991.1
625.42
600.02
392.61
251.26
139.68
28.5
1641.95
1484.69
1847.09
WASH180
2081.05
2258.25
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485.15
357.34
150.52
22.86
952.43
1071.77
WASH215
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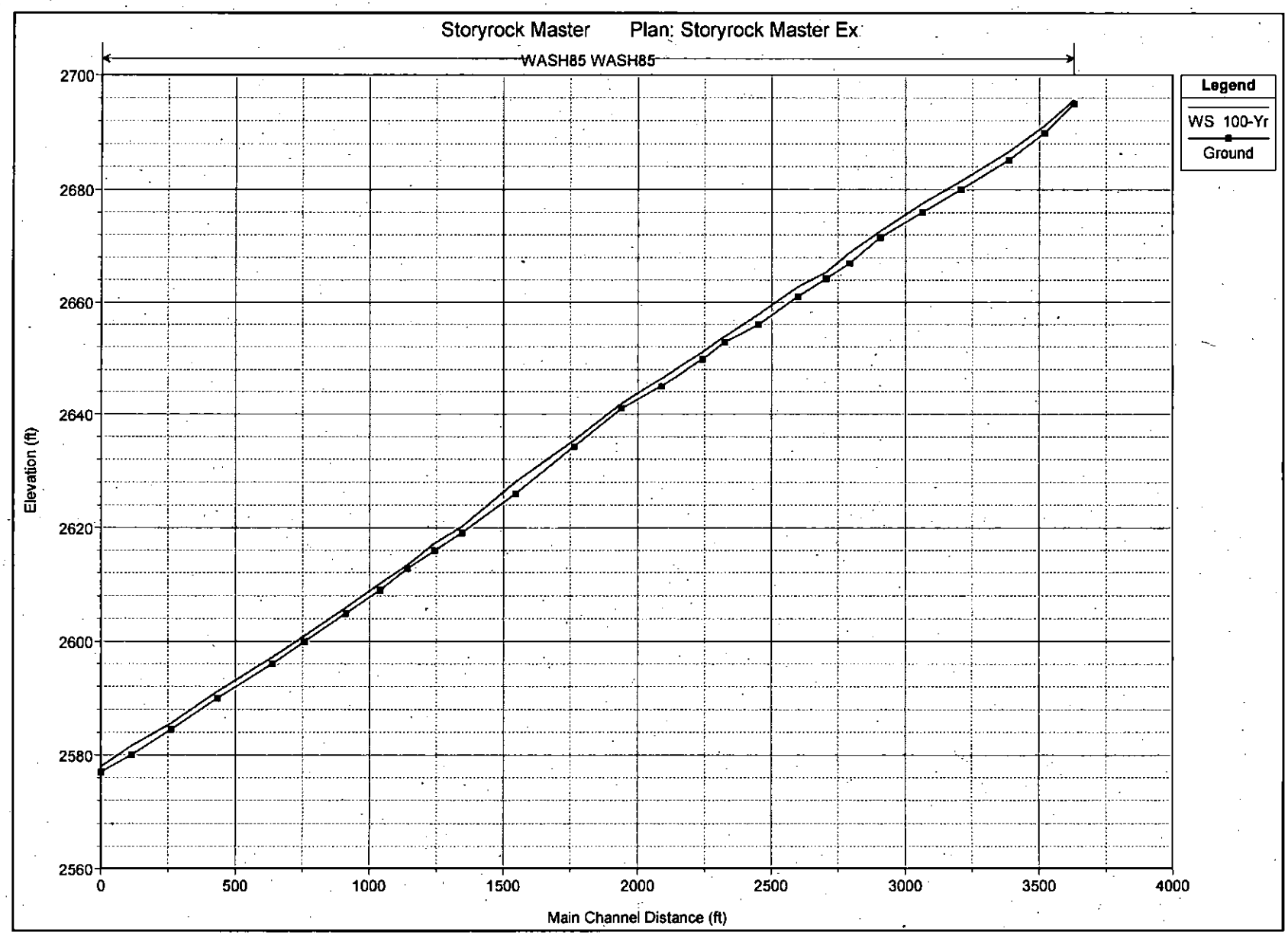
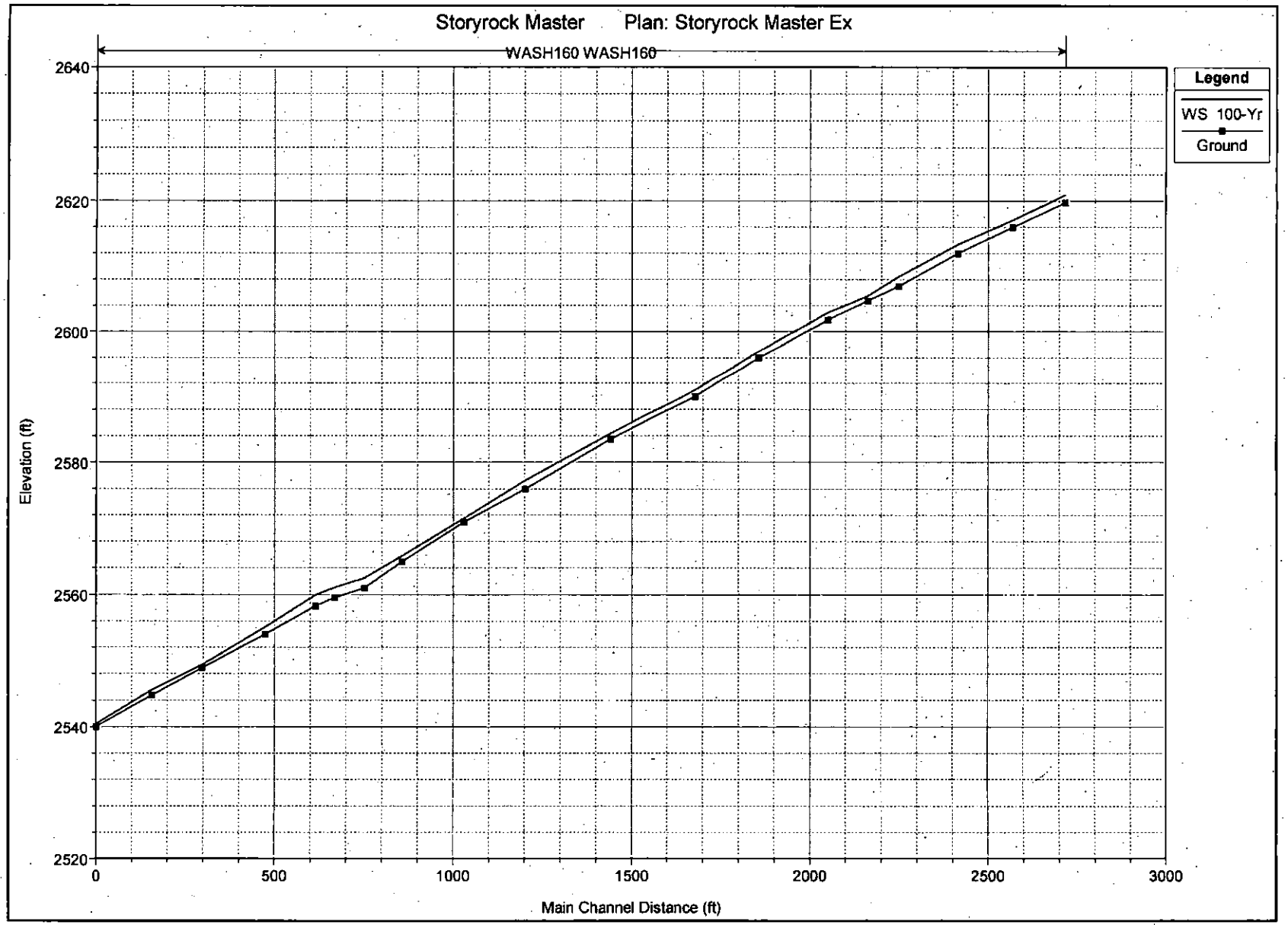
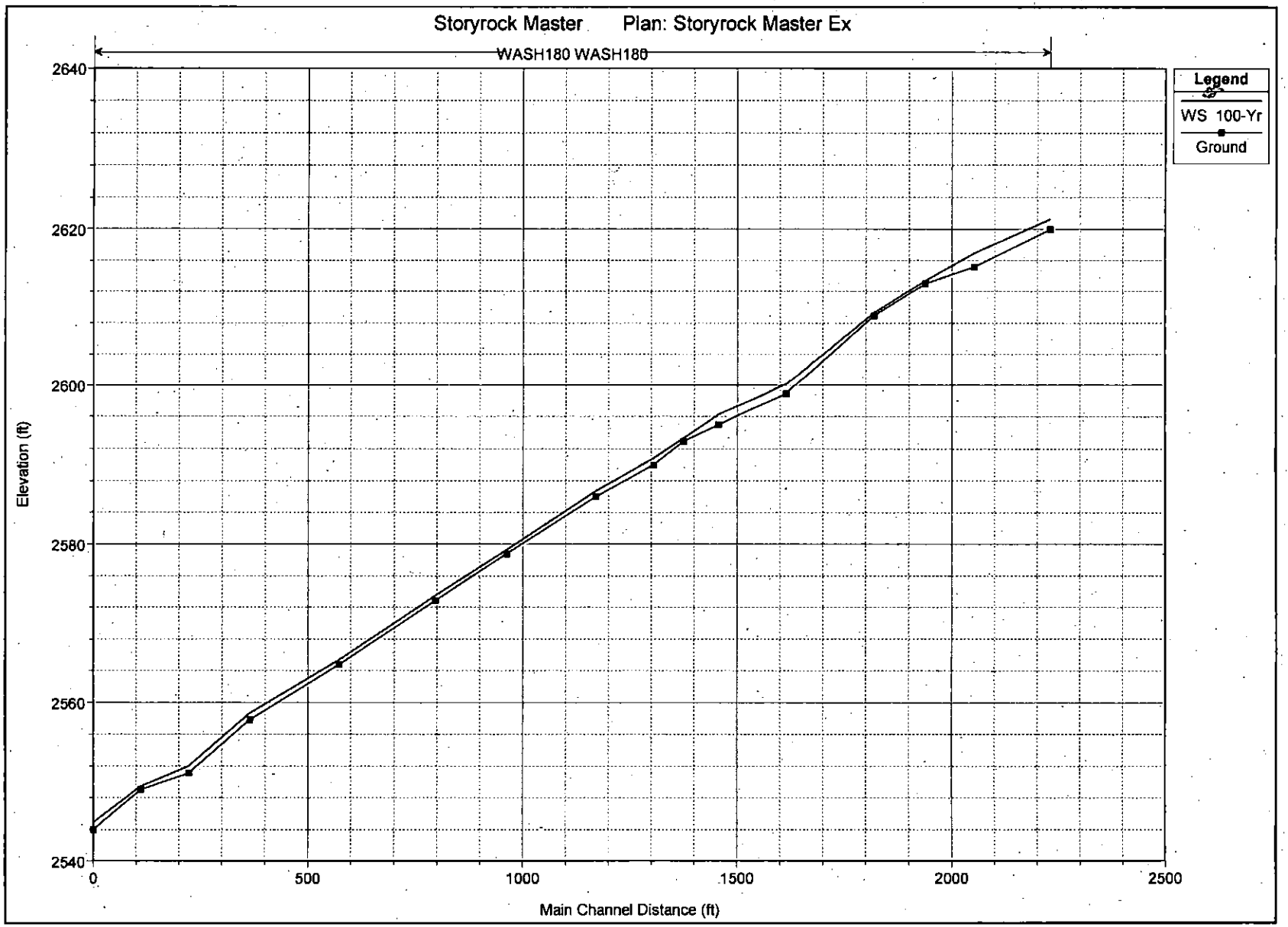
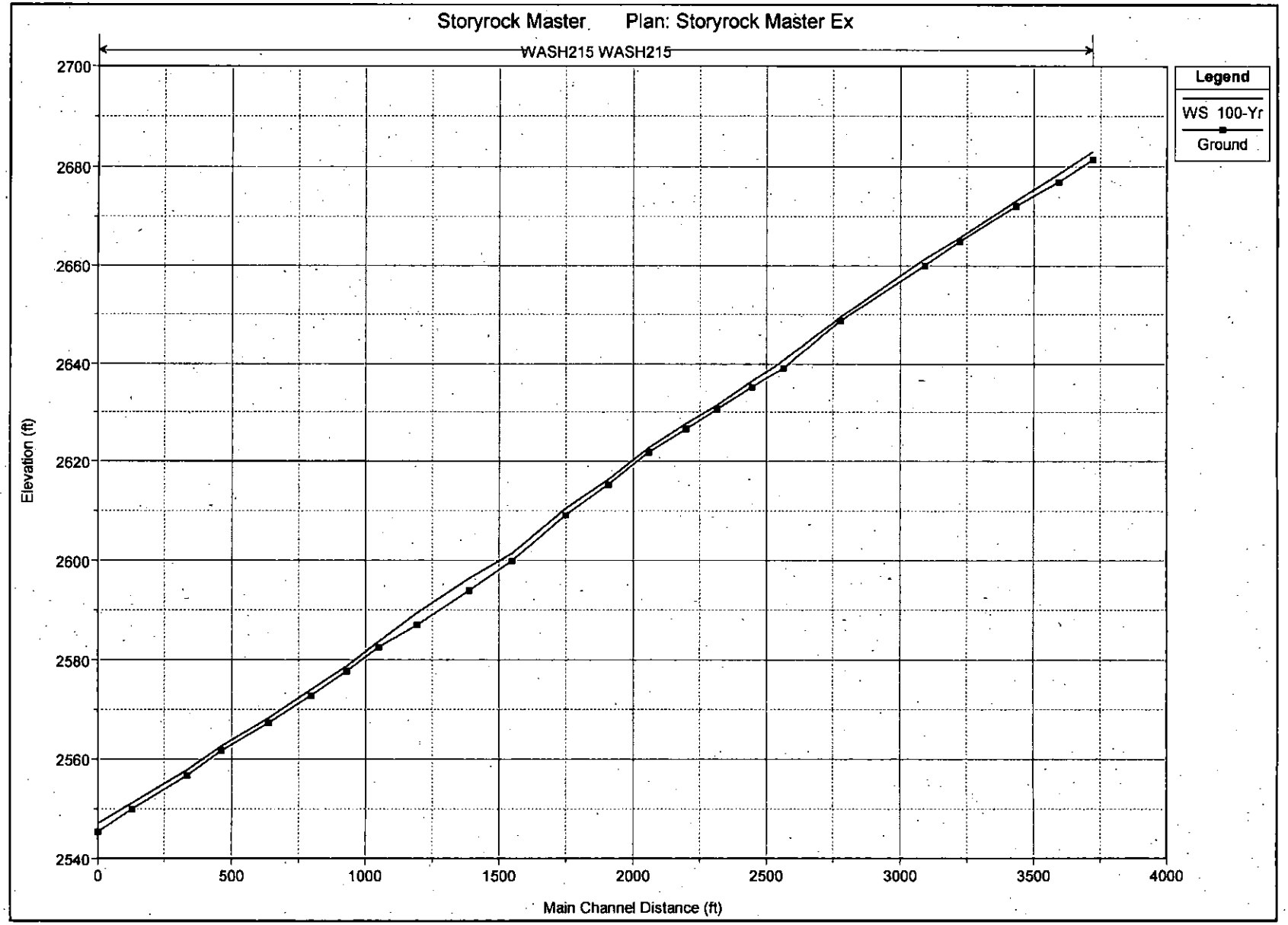
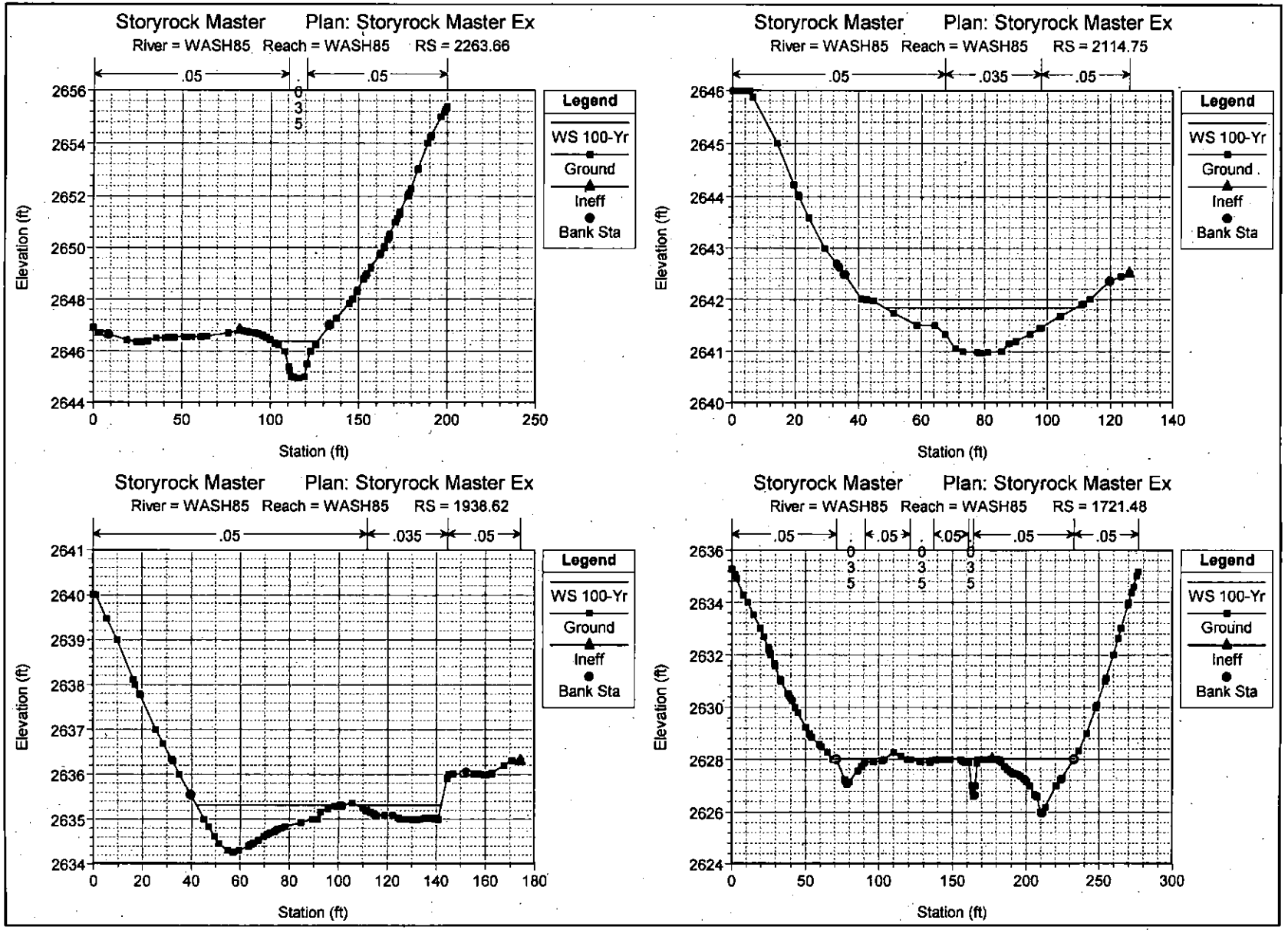
1411.45
1570.3
1770.11

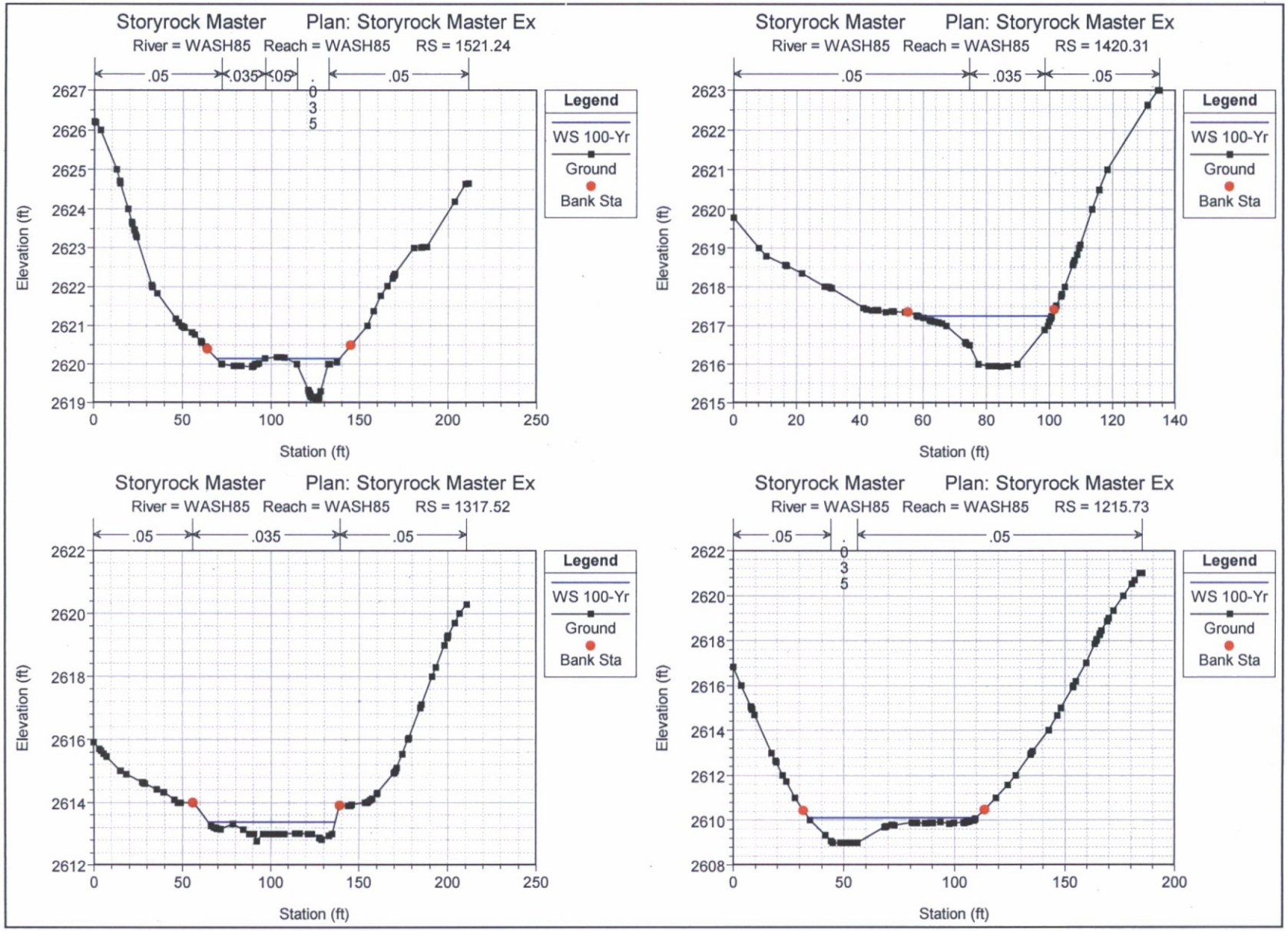

Storyrock Master Plan: Storyrock Master Ex
WASH85 WASH85
Legend
WS 100-Yr
Ground
Elevation (ft)
2700
2680
2660
2640
2620
2600
2580
2560
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)

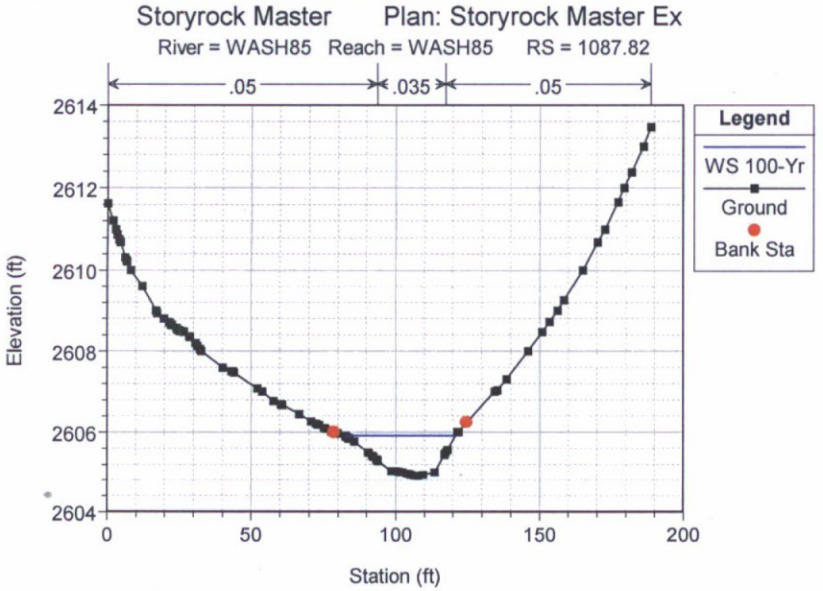

Storyrock Master Plan: Storyrock Master Ex
WASH160 WASH160
Legend
WS 100-Yr
Ground
Elevation (ft)
2640
2620
2600
2580
2560
2540
2520
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)

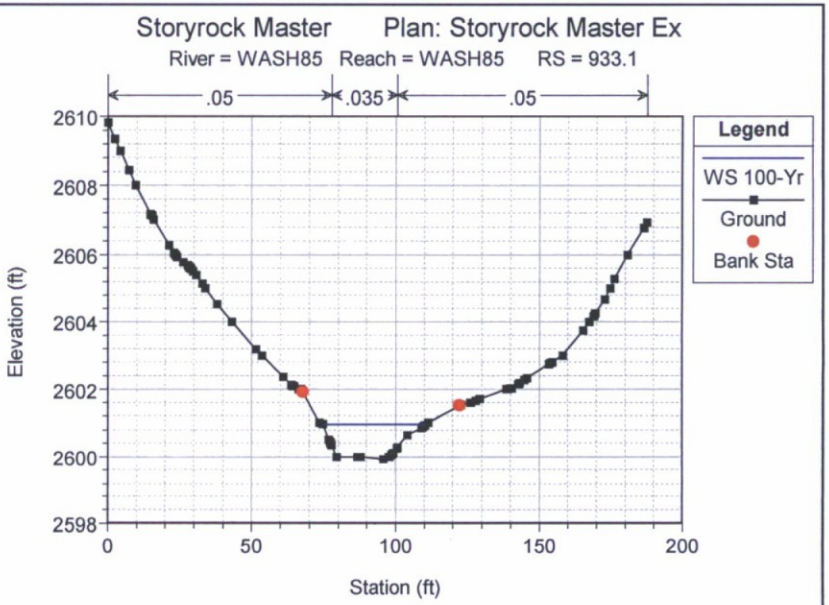

Storyrock Master Plan: Storyrock Master Ex
WASH180 WASH180
Legend
WS 100-Yr
Ground
Elevation (ft)
2640
2620
2600
2580
2560
2540
0
500
1000
1500
2000
2500
Main Channel Distance (ft)

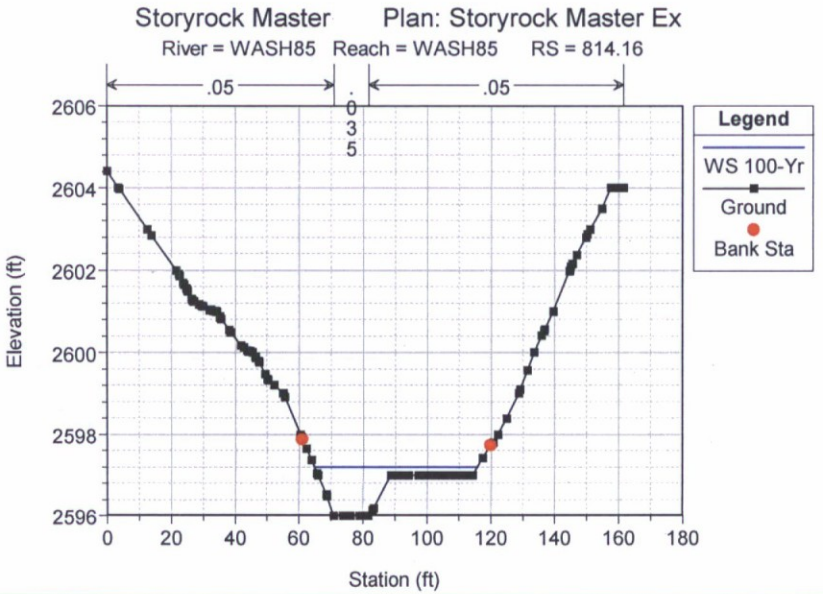

Storyrock Master Plan: Storyrock Master Ex
WASH215 WASH215
Legend
WS 100-Yr
Ground
Elevation (ft)
2700
2680
2660
2640
2620
2600
2580
2560
2540
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)

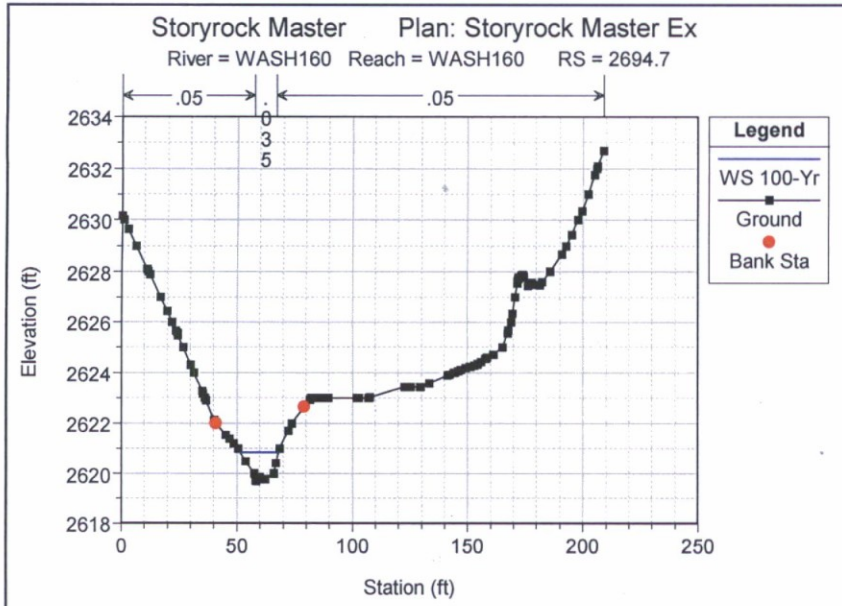

Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 2263.66
.05
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 2114.75
.05
.035
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 1936.62
.05
.035
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 1721.48
.05
.05
.05
.05
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

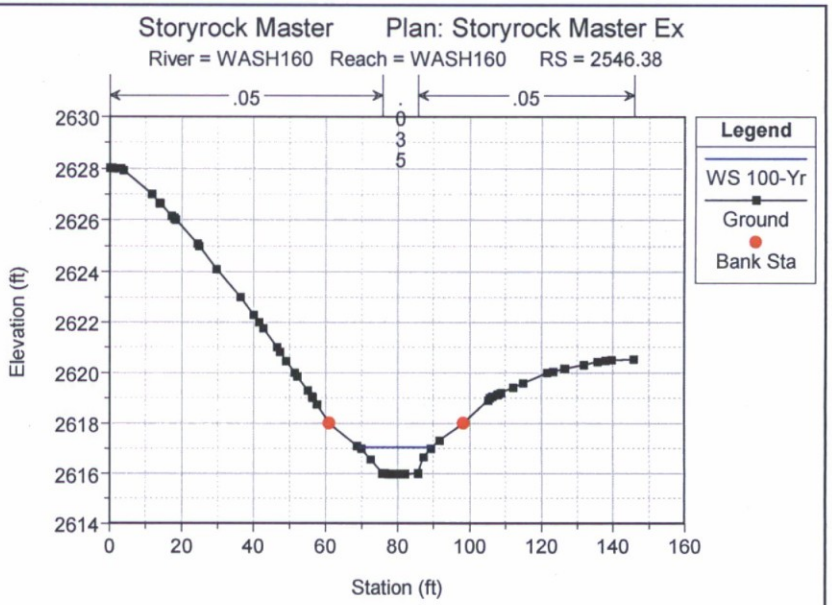

Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 1521.24
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 1420.31
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 1317.52
.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 = 1215.73
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

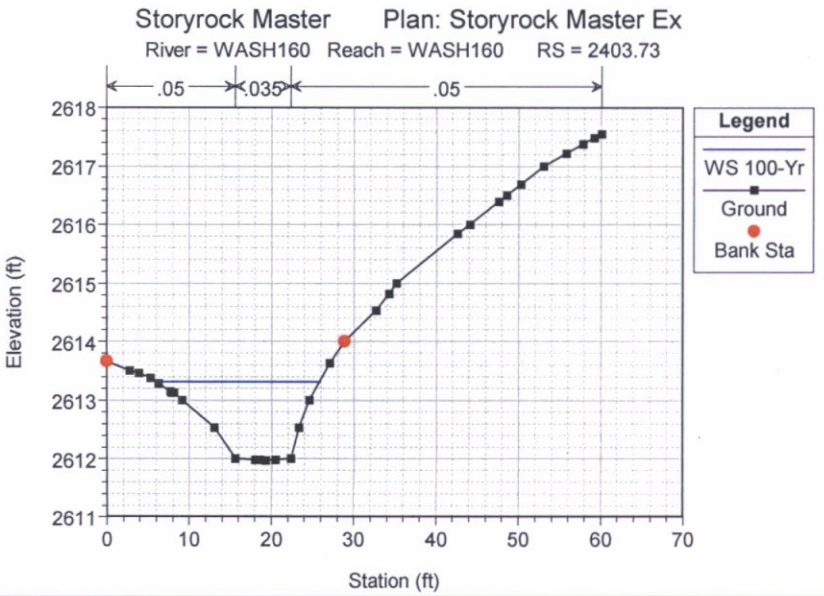

Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 1087.82
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta

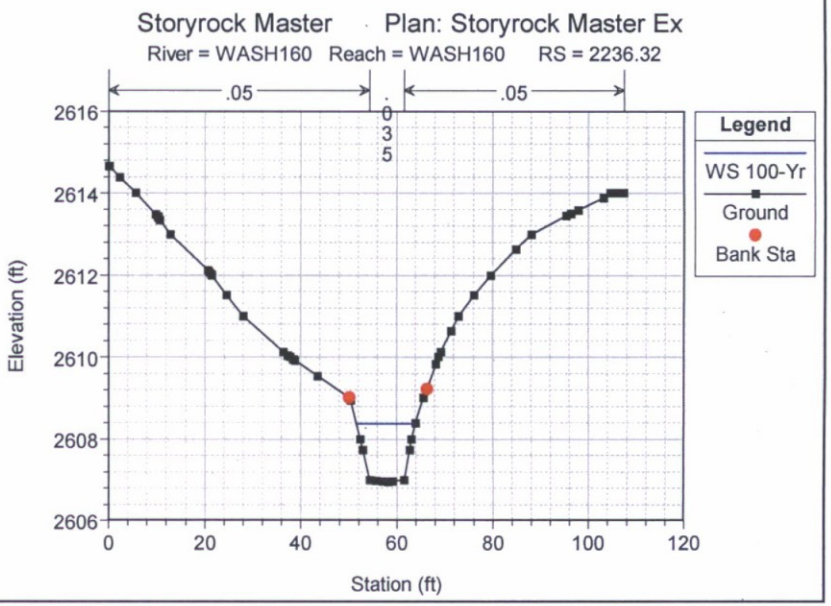

Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 933.1
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta

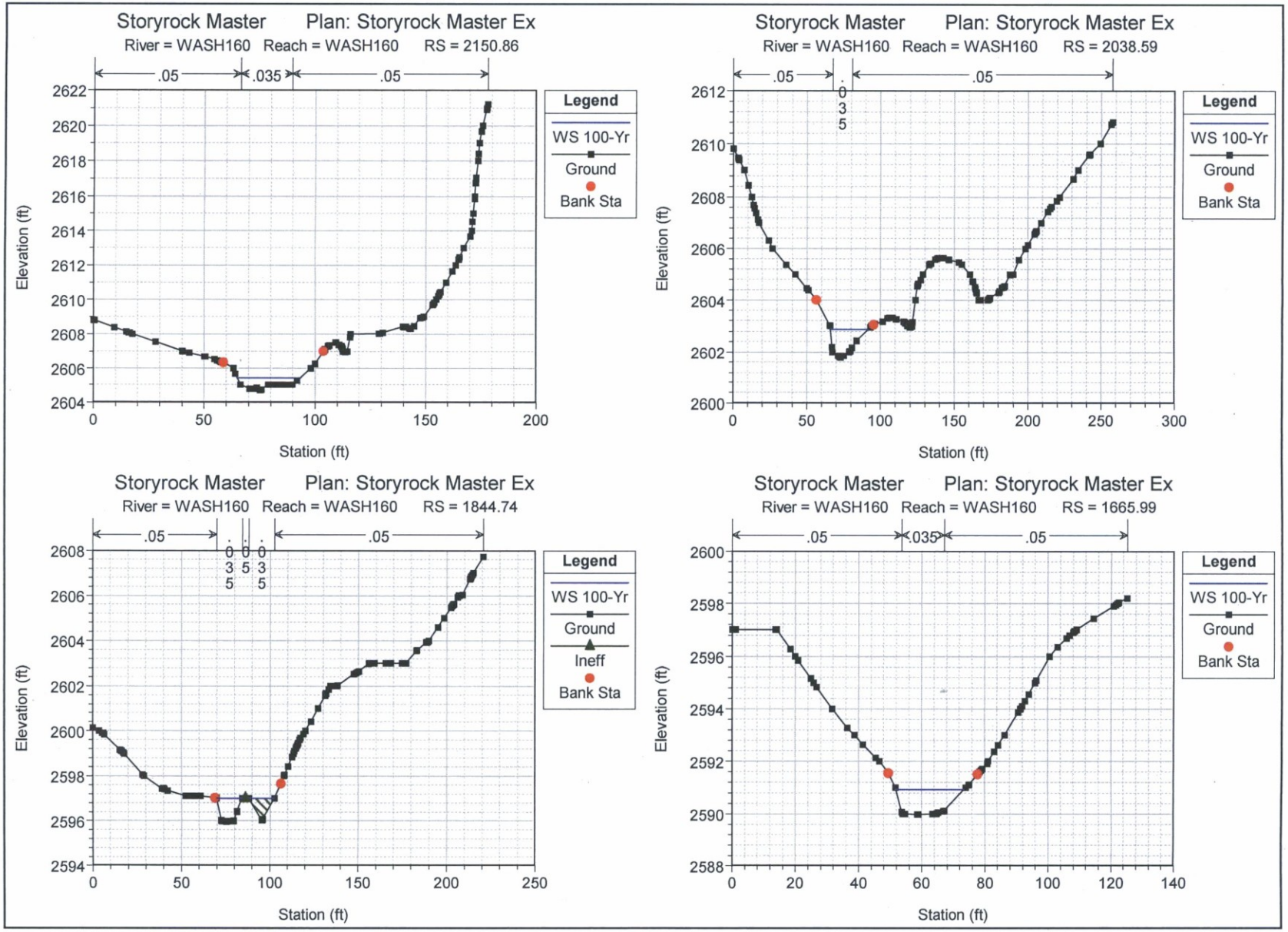

Storyrock Master Plan: Storyrock Master Ex
River = WASH85 Reach = WASH85 RS = 814.16
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta

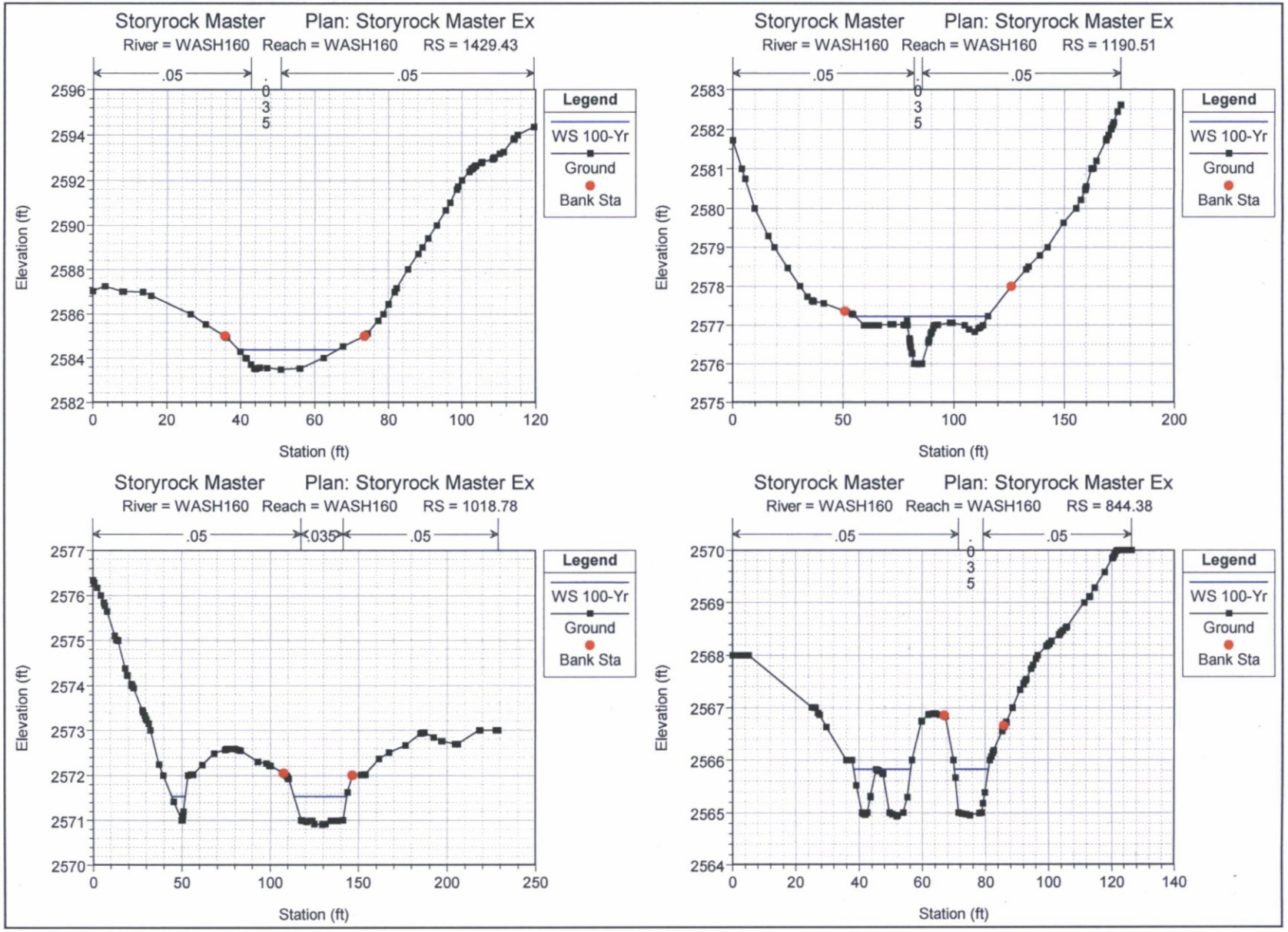

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 2694.7
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

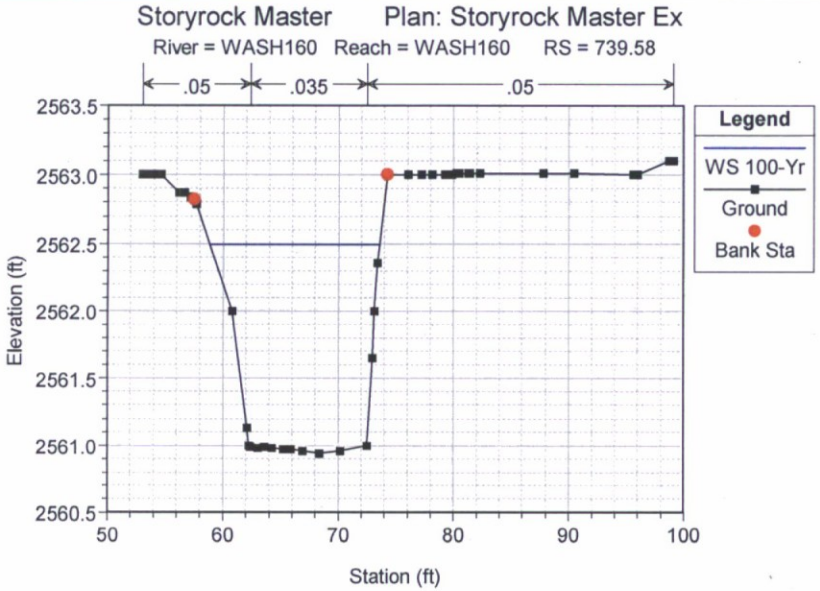

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 2546.38
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

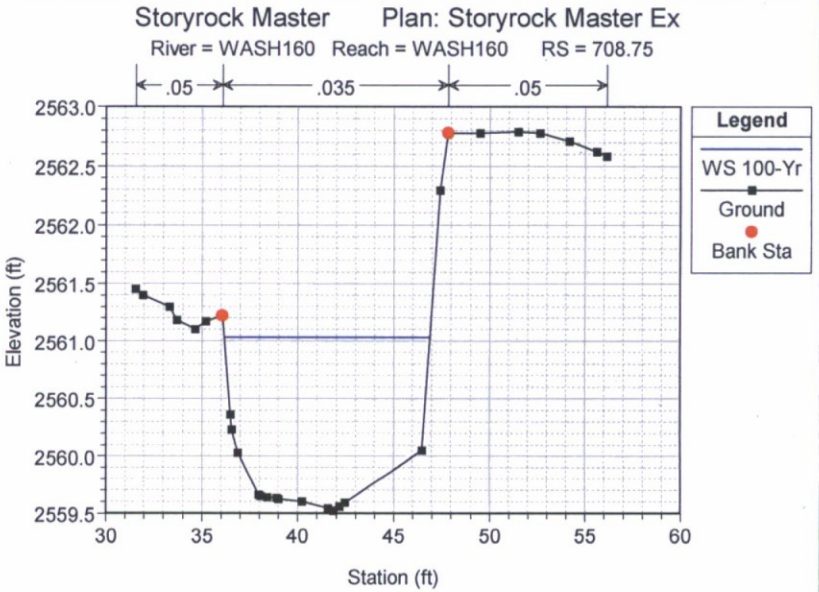

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 2403.73
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

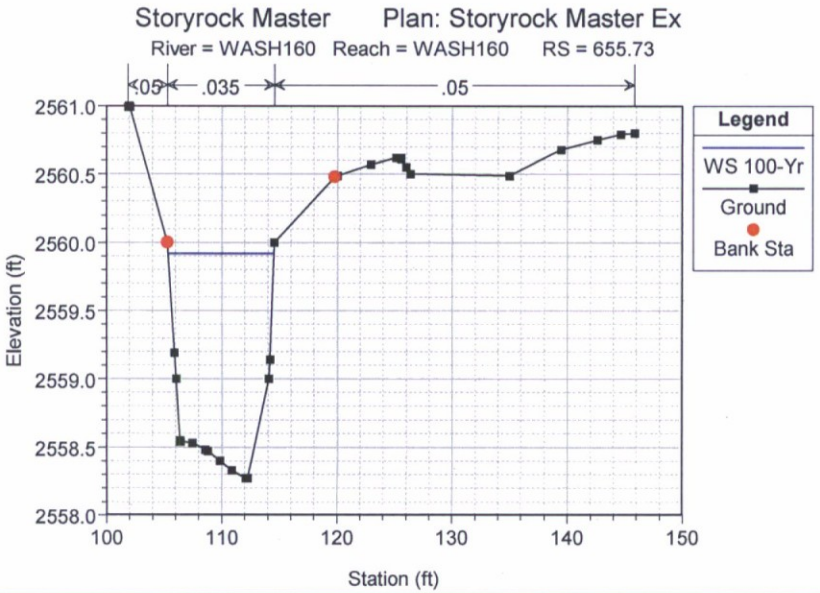

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 2236.32
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

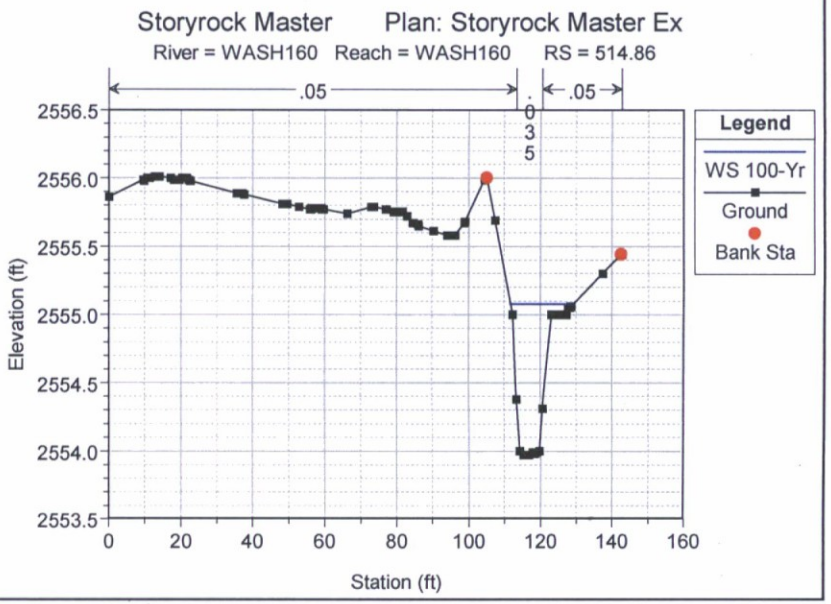

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 2150.86
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 2038.59
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 1844.74
.05
.035
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 1665.99
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

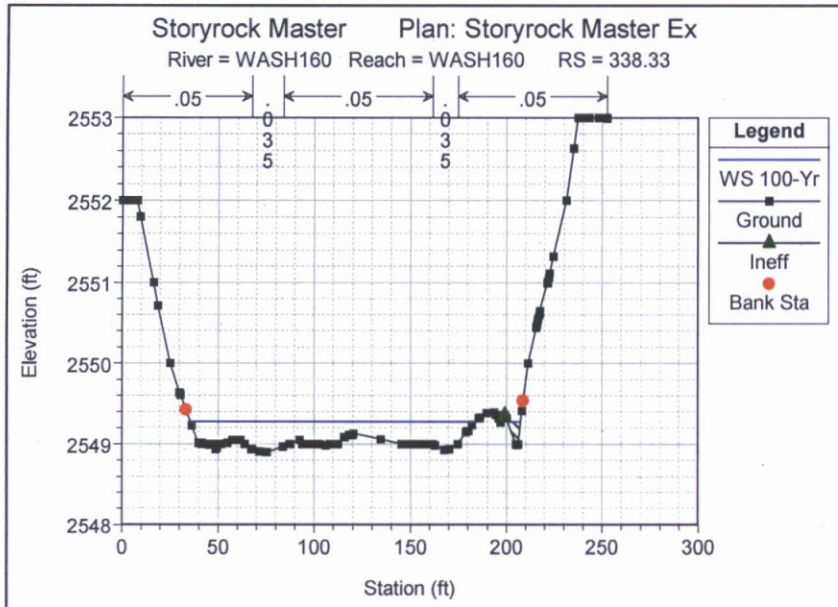

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 1429.43
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 1190.51
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 1018.78
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 844.38
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

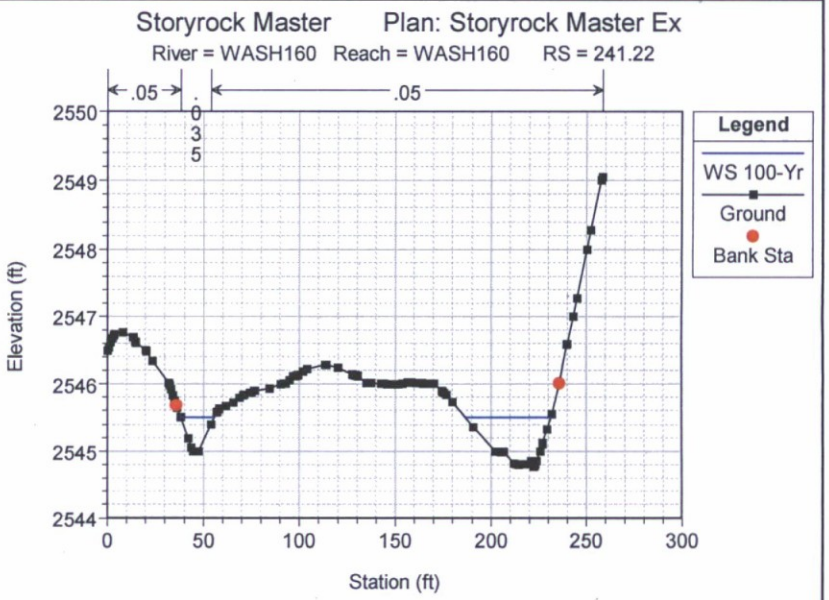

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 739.58
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

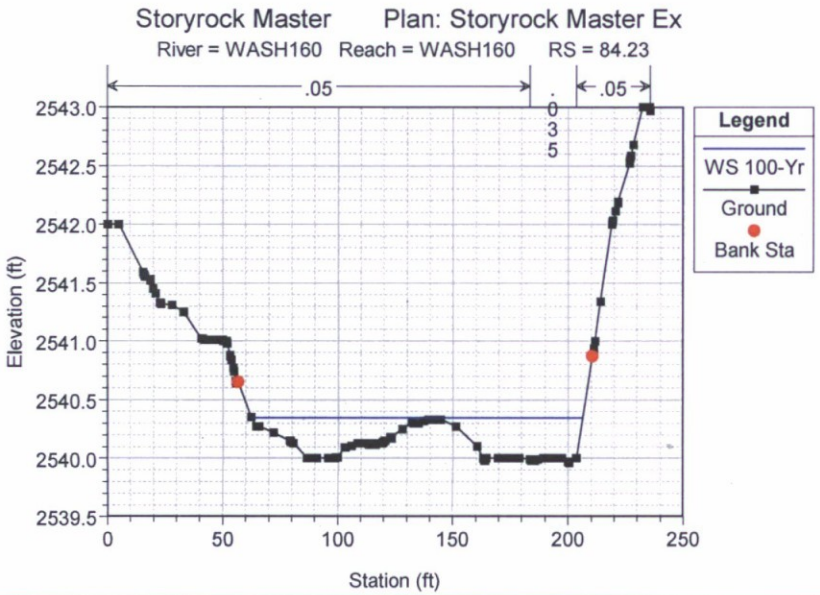

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 708.75
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

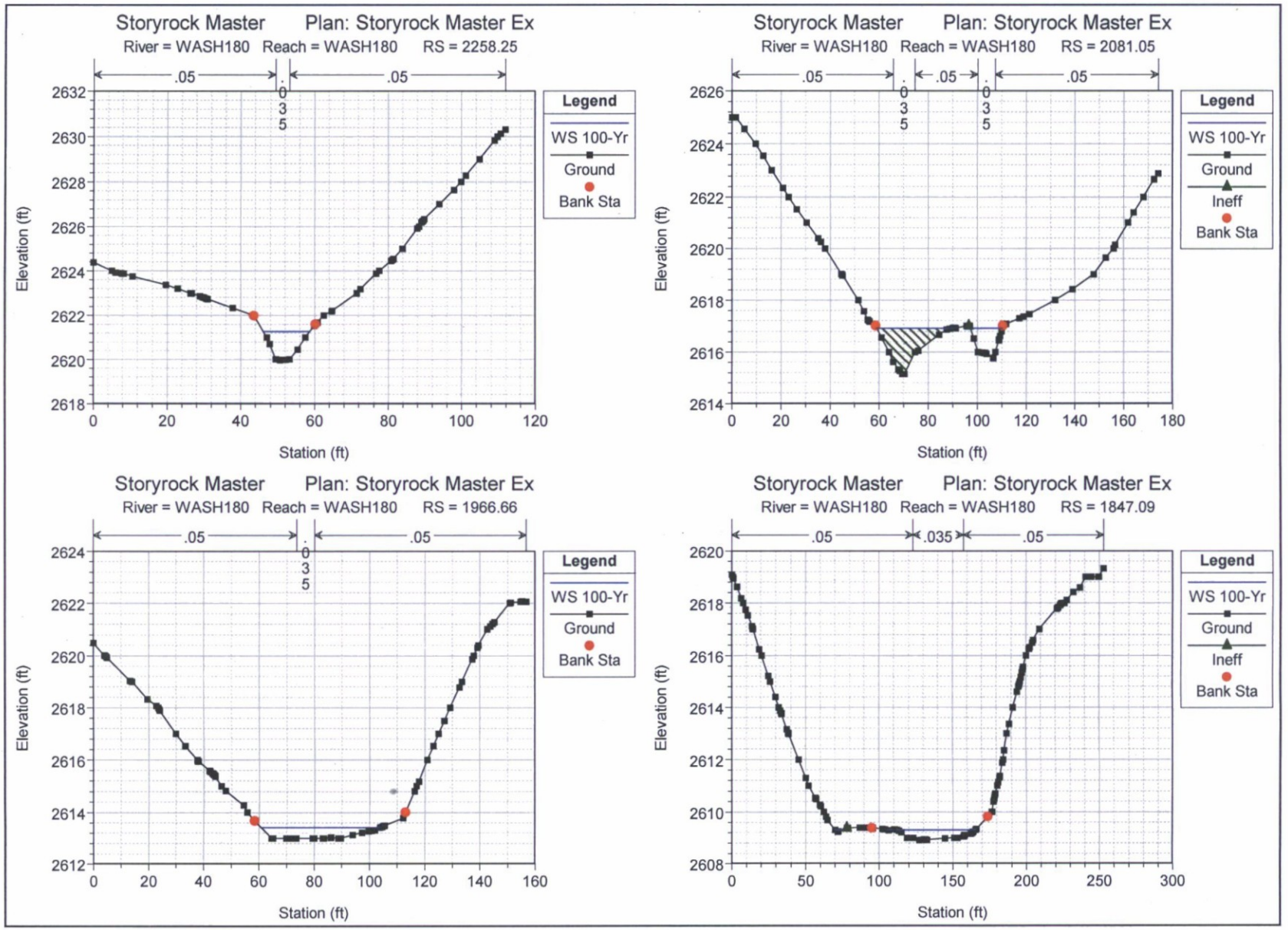

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 655.73
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

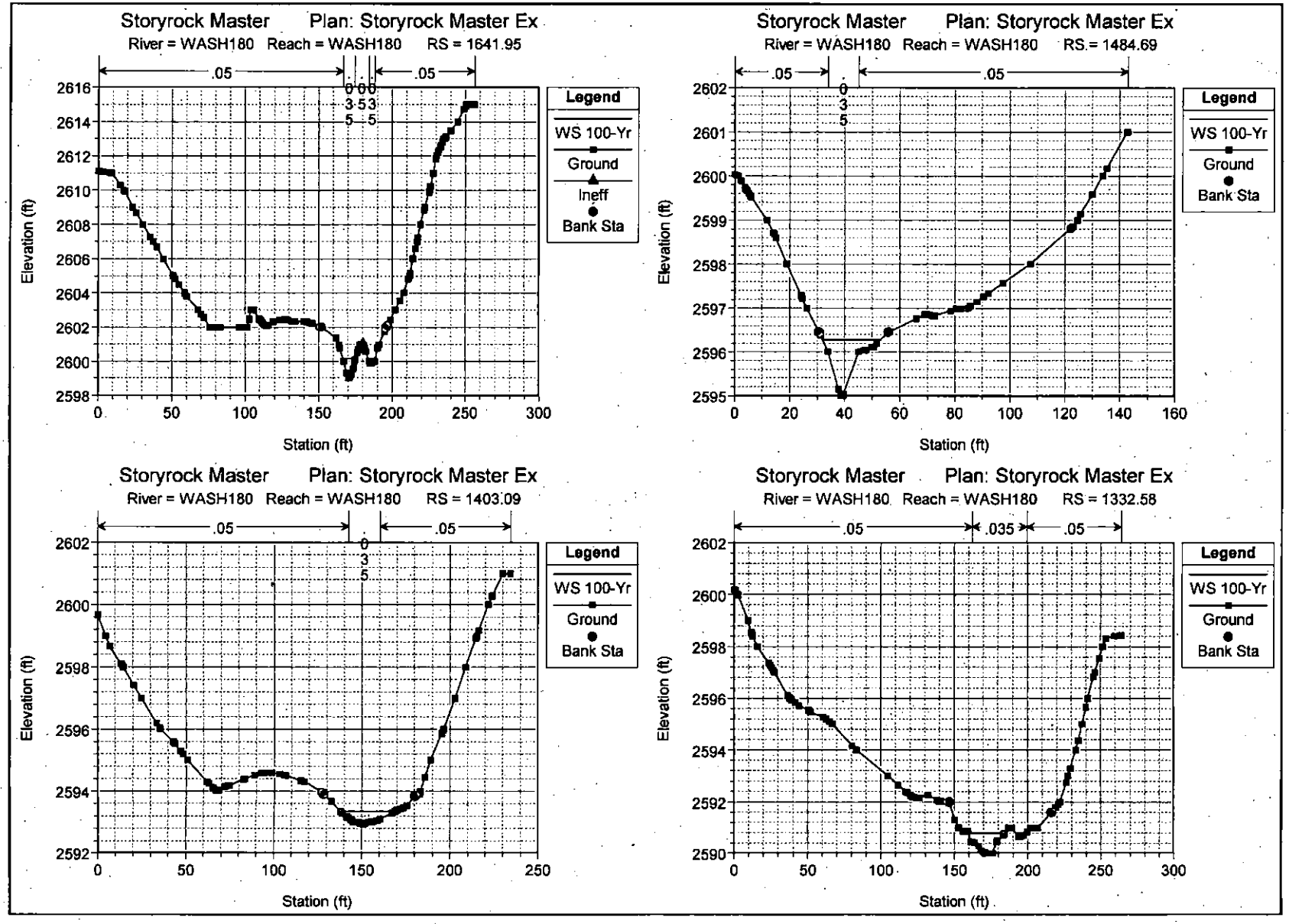

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 514.86
.05
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

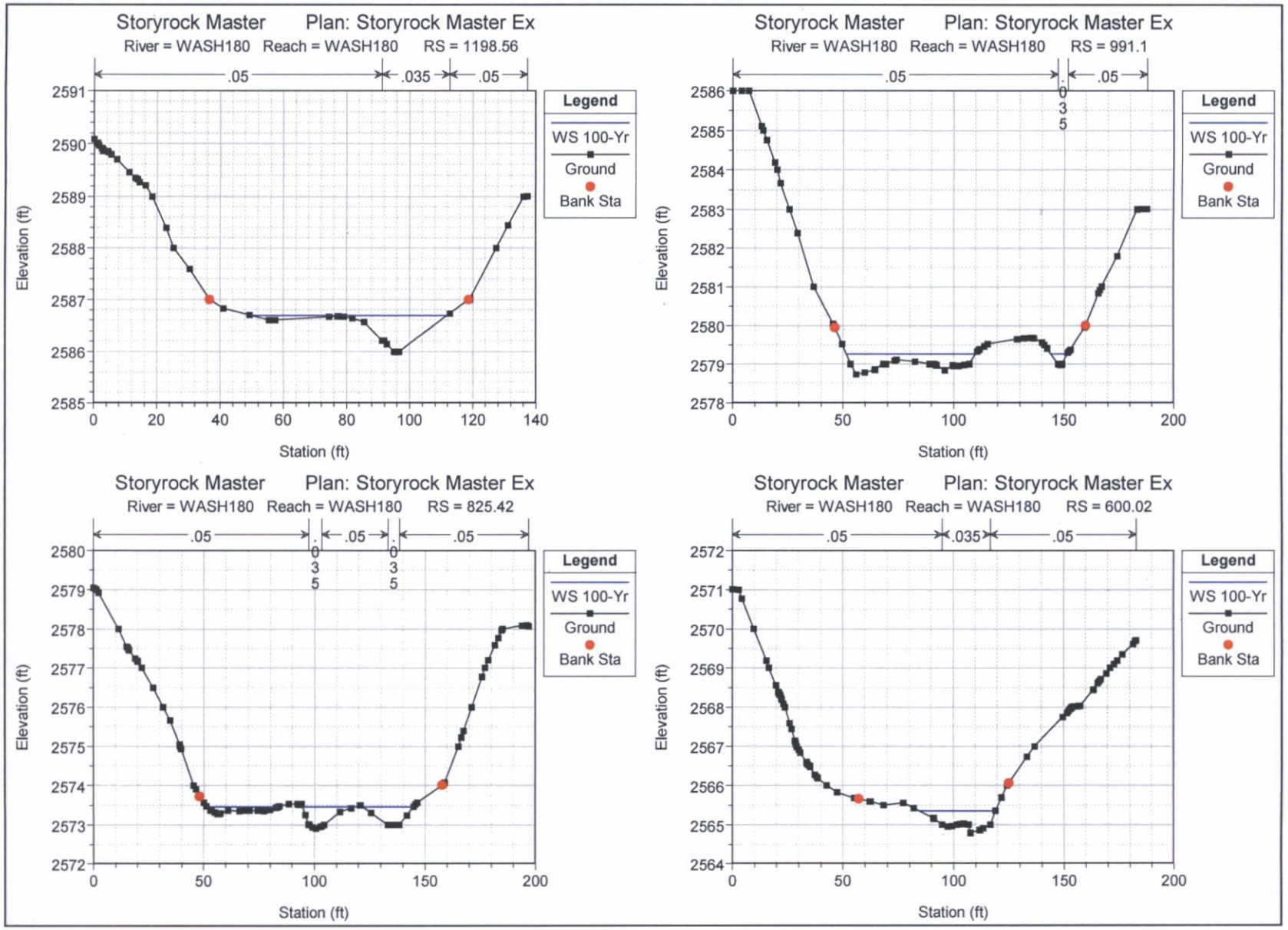

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 338.33
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2553
2552
2551
2550
2549
2548
0
50
100
150
200
250
300

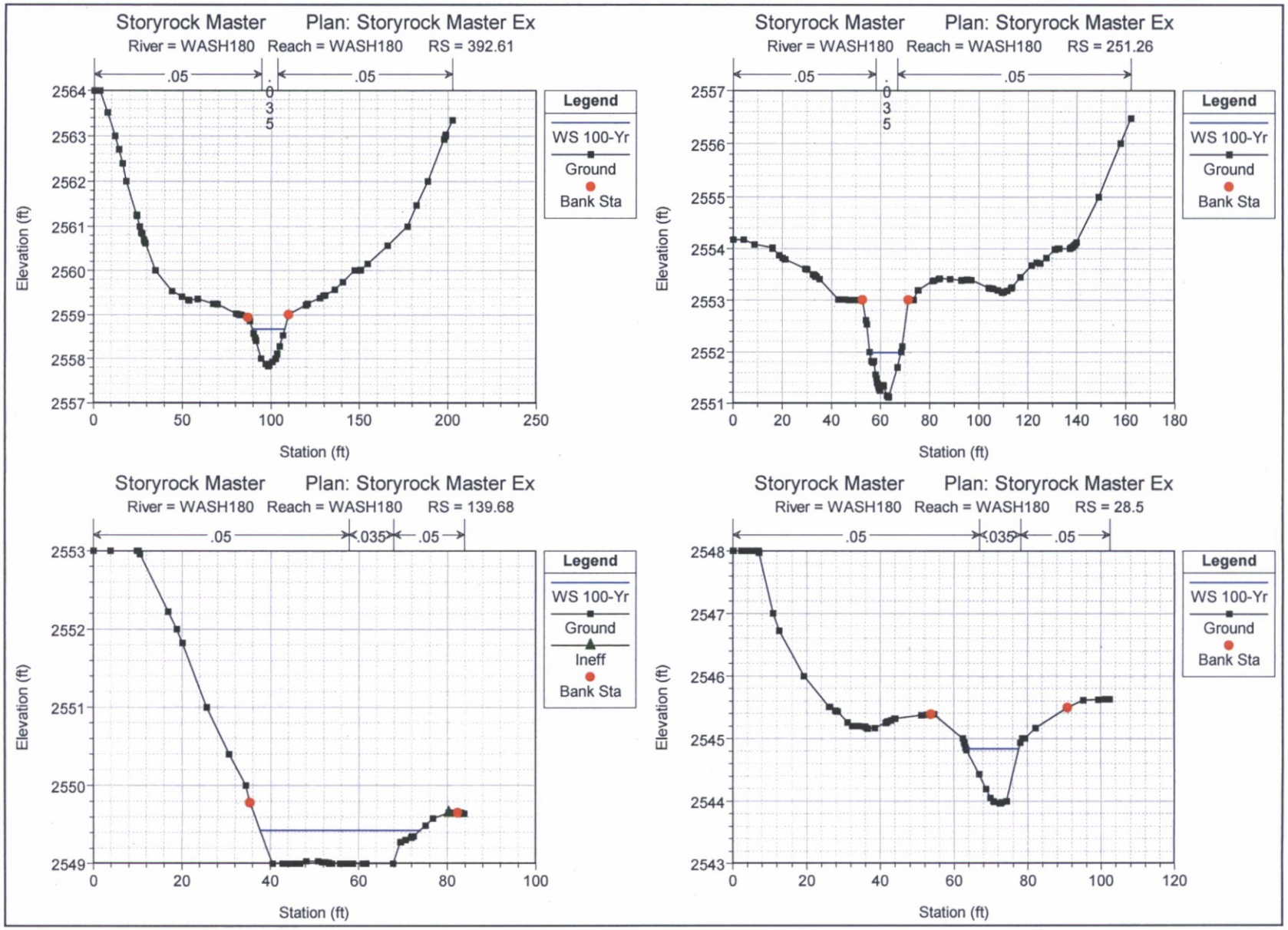

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 241.22
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2550
2549
2548
2547
2546
2545
2544
0
50
100
150
200
250
300

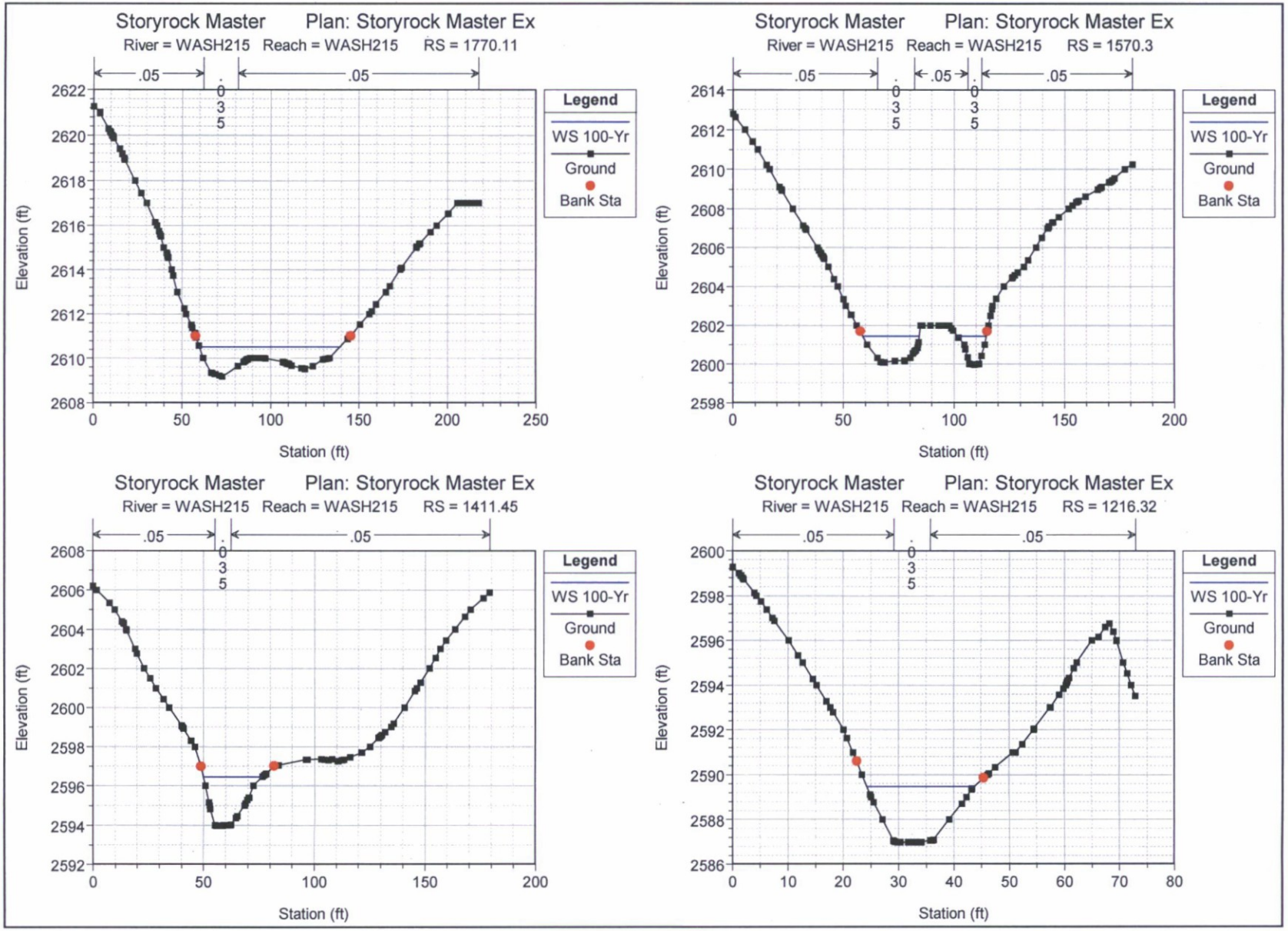

Storyrock Master Plan: Storyrock Master Ex
River = WASH160 Reach = WASH160 RS = 84.23
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
2543.0
2542.5
2542.0
2541.5
2541.0
2540.5
2540.0
2539.5
0
50
100
150
200
250

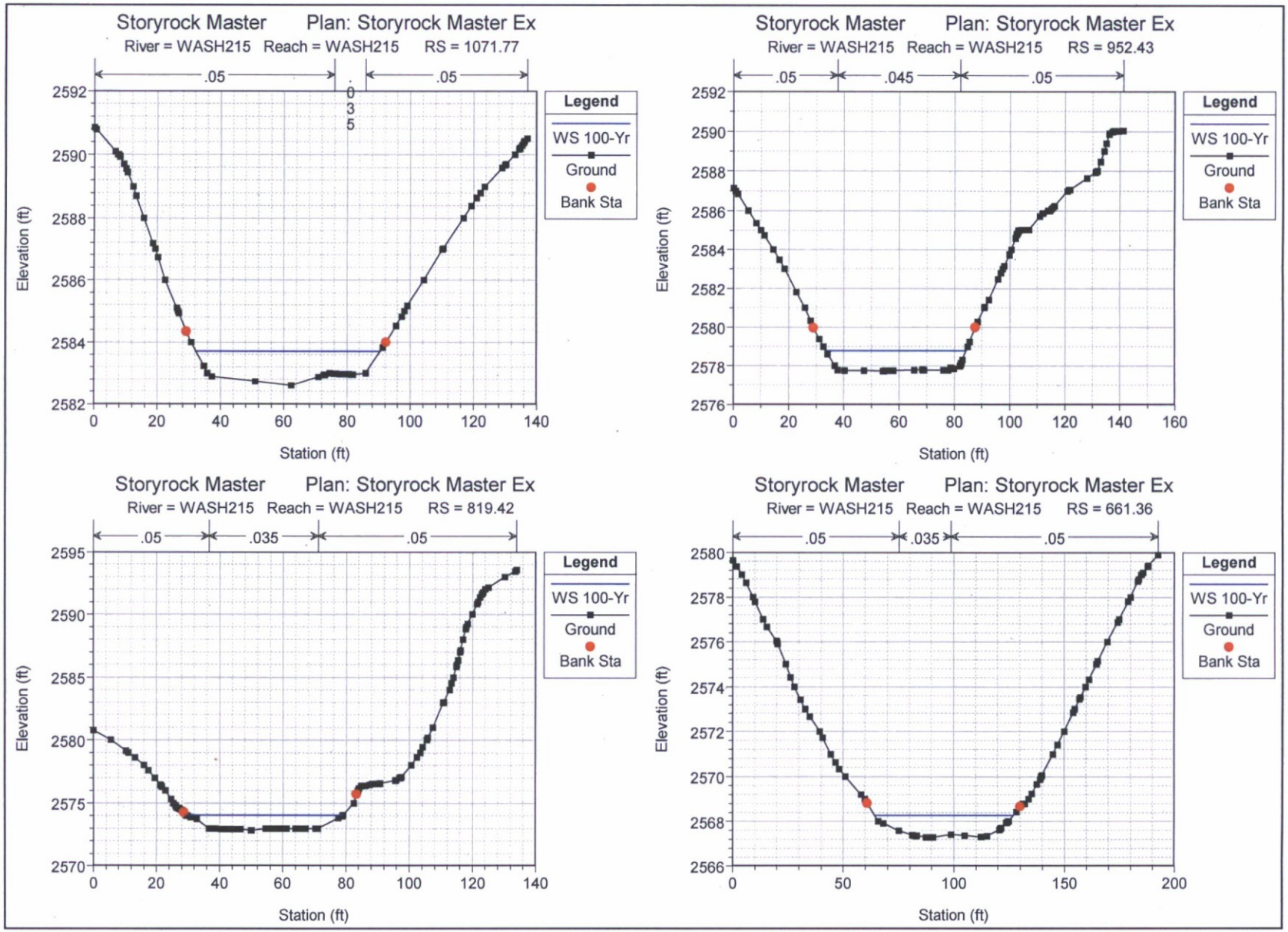

Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 2258.25
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 2081.05
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 1966.66
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 1847.09
.05
.035
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 1641.95
.05
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 1484.69
.05
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 1403.09
.05
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 1332.58
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 1198.56
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 991.1
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 825.42
.05
.035
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 600.02
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 392.61
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 251.26
.05
.035
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 139.68
.05
.035
.05
Legend
WS 100-Yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH180 Reach = WASH180 RS = 28.5
.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 = 1770.11
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 1570.3
.05
.035
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 1411.45
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 1216.32
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta


Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 1071.77
.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 = 952.43
.05
.045
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 819.42
.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 = 661.36
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.035
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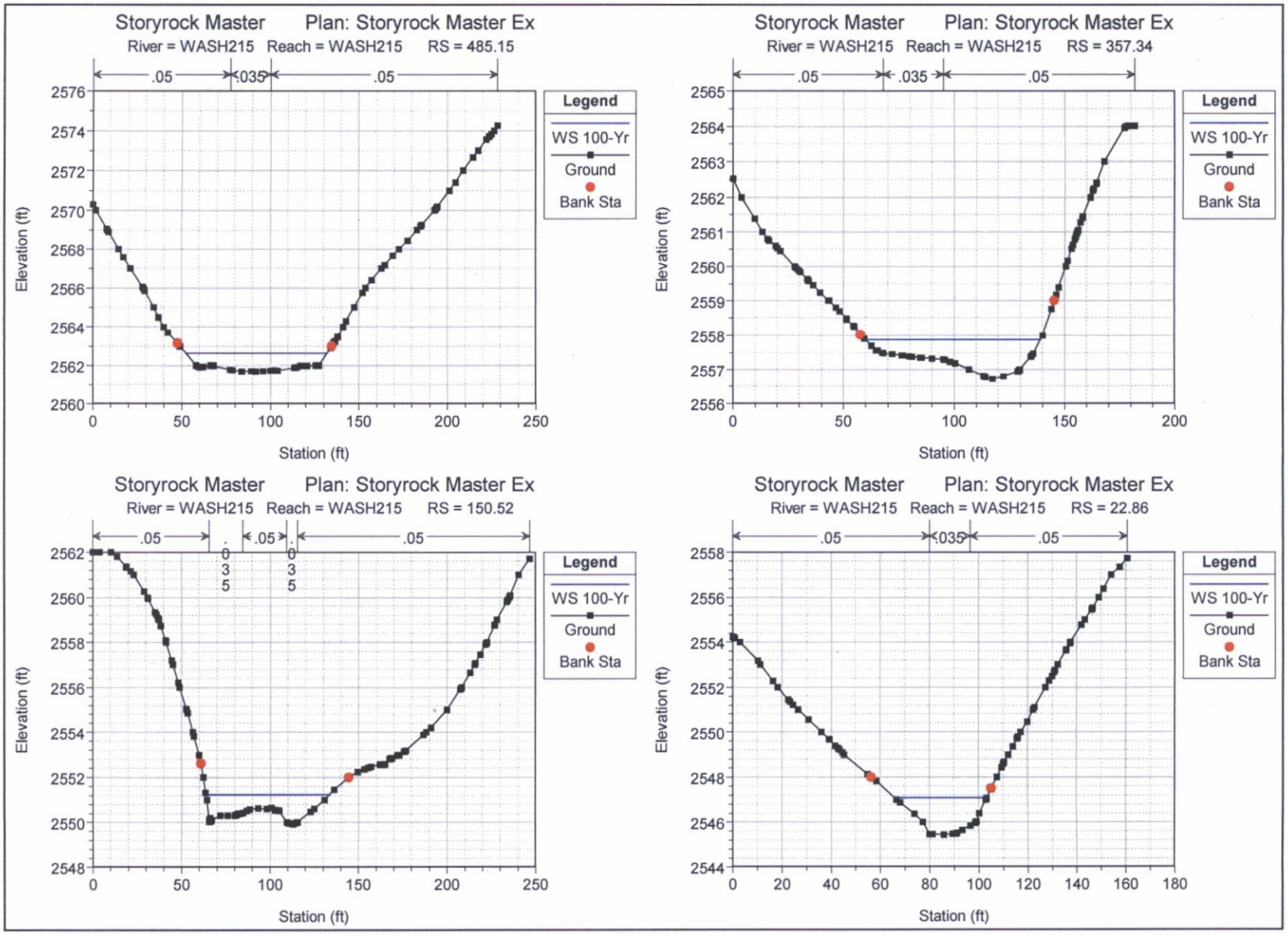
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 485.15
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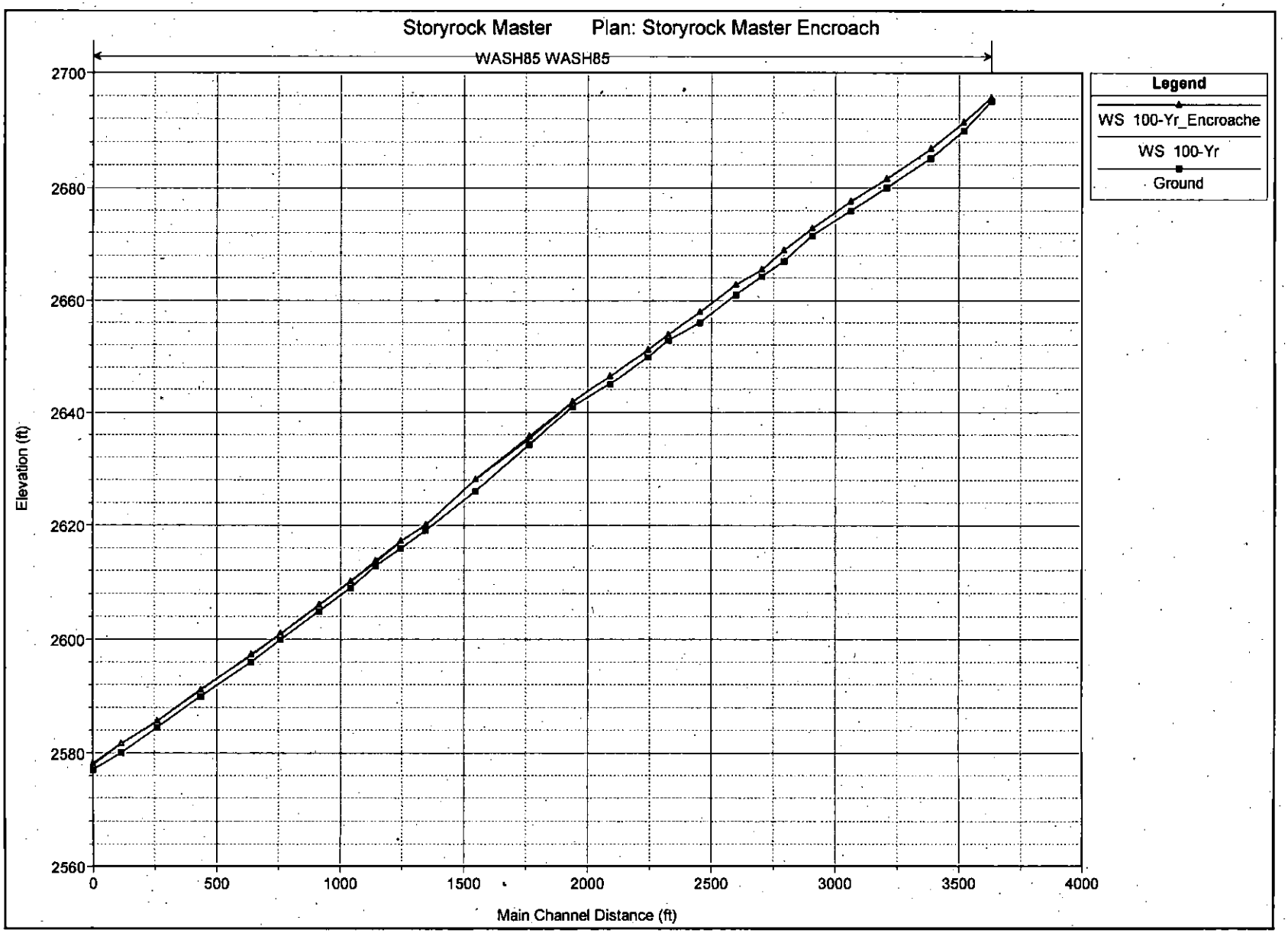
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 357.34
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 150.52
.05
.035
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Ex
River = WASH215 Reach = WASH215 RS = 22.86
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta

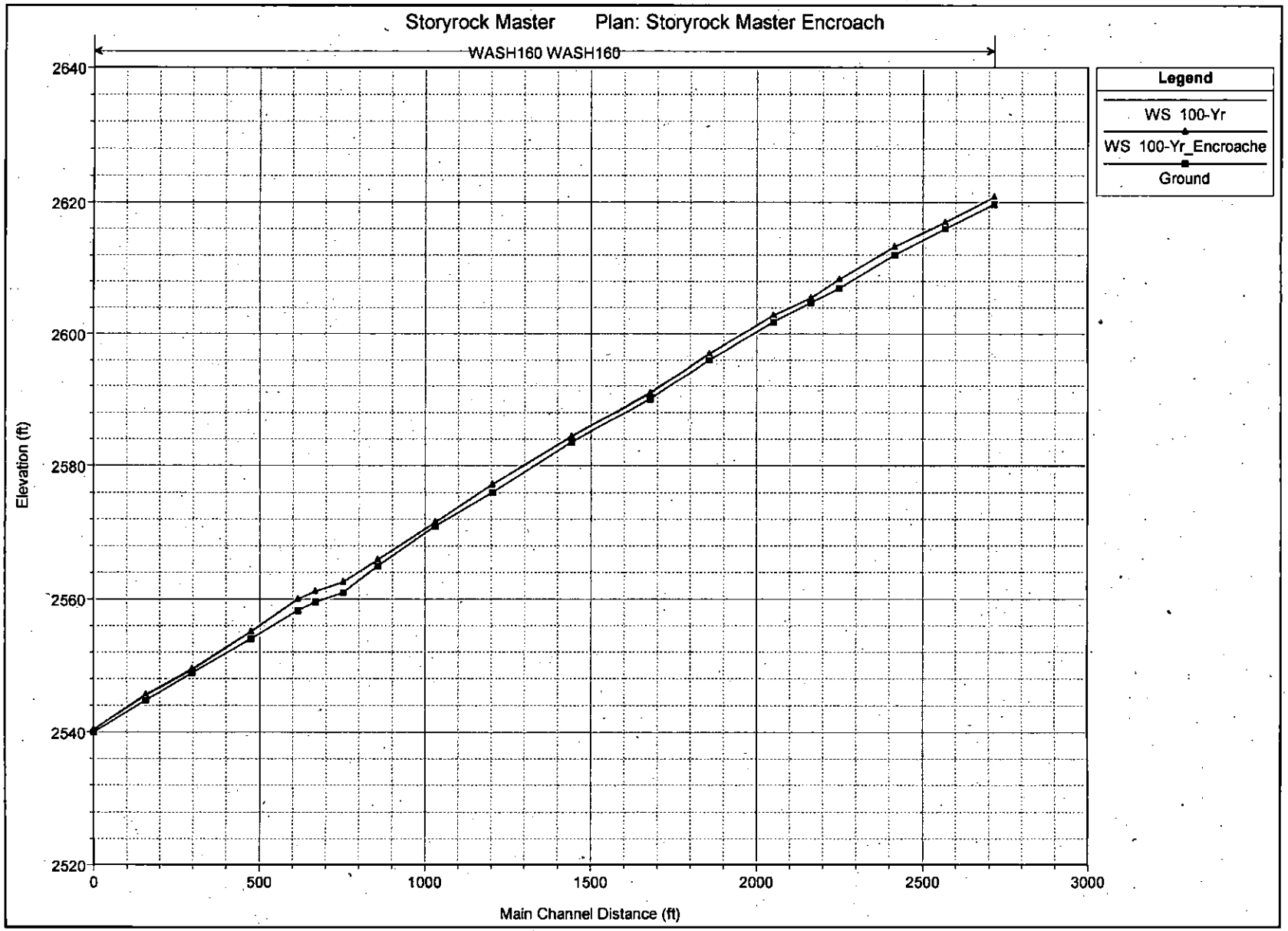
HEC-RAS Plan: Ex Locations: User Defined Profile: 100-Yr

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)	
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	2114.75	100-Yr	156.00	2640.97	2641.84	2641.97	2642.29	0.035912	5.41	28.85	60.34	1.38
WASH85	WASH85	1938.62	100-Yr	156.00	2634.26	2635.31	2635.33	2635.55	0.045016	3.91	39.90	94.34	1.06
WASH85	WASH85	1721.48	100-Yr	156.00	2625.94	2628.04	2628.04	2628.13	0.016134	2.36	66.09	151.35	0.62
WASH85	WASH85	1521.24	100-Yr	156.00	2619.06	2620.15	2620.44	2621.31	0.106785	8.64	18.05	58.86	2.75
WASH85	WASH85	1420.31	100-Yr	156.00	2615.94	2617.25	2617.27	2617.64	0.016565	5.02	31.08	42.79	1.04
WASH85	WASH85	1317.52	100-Yr	156.00	2612.77	2613.37	2613.57	2614.07	0.111026	6.69	23.33	71.72	2.07
WASH85	WASH85	1215.73	100-Yr	156.00	2609.00	2610.11	2610.12	2610.37	0.024461	4.11	37.99	75.96	1.02
WASH85	WASH85	1087.82	100-Yr	156.00	2604.91	2605.90	2606.10	2606.56	0.037294	6.55	23.82	37.92	1.46
WASH85	WASH85	933.1	100-Yr	156.00	2599.93	2600.95	2601.11	2601.54	0.028280	6.15	25.37	35.68	1.29
WASH85	WASH85	814.16	100-Yr	156.00	2596.00	2597.20	2597.33	2597.73	0.036231	5.88	26.51	50.93	1.44
WASH160	WASH160	2694.7	100-Yr	79.00	2619.72	2620.85	2621.03	2621.52	0.035097	6.56	12.04	16.71	1.36
WASH160	WASH160	2546.38	100-Yr	79.00	2615.97	2617.04	2617.08	2617.46	0.021204	5.20	15.19	20.13	1.05
WASH160	WASH160	2403.73	100-Yr	79.00	2611.97	2613.32	2613.28	2613.69	0.029571	4.87	16.22	19.88	0.95
WASH160	WASH160	2236.32	100-Yr	79.00	2606.95	2608.37	2608.37	2608.92	0.027301	5.94	13.31	12.27	1.00
WASH160	WASH160	2150.86	100-Yr	79.00	2604.69	2605.45	2605.59	2605.95	0.044906	5.68	13.92	28.66	1.44
WASH160	WASH160	2038.59	100-Yr	79.00	2601.77	2602.88	2602.88	2603.21	0.018211	4.66	16.97	25.62	1.01
WASH160	WASH160	1844.74	100-Yr	79.00	2595.97	2597.00	2597.02	2597.84	0.046021	7.37	10.72	28.81	1.51
WASH160	WASH160	1665.99	100-Yr	79.00	2589.97	2590.93	2590.93	2591.31	0.028593	4.94	16.00	21.79	1.02
WASH160	WASH160	1429.43	100-Yr	79.00	2583.51	2584.40	2584.40	2584.72	0.028489	4.58	17.24	27.08	1.01
WASH160	WASH160	1190.51	100-Yr	79.00	2575.99	2577.23	2577.26	2577.45	0.032863	3.76	21.02	60.29	1.12
WASH160	WASH160	1018.78	100-Yr	79.00	2570.91	2571.53	2571.60	2571.89	0.032270	4.90	17.30	37.54	1.21
WASH160	WASH160	844.38	100-Yr	79.00	2564.95	2565.83	2565.88	2566.19	0.036761	5.56	17.50	29.04	1.16
WASH160	WASH160	739.58	100-Yr	79.00	2560.94	2562.49	2562.16	2562.78	0.011687	4.33	18.26	14.72	0.68
WASH160	WASH160	708.75	100-Yr	79.00	2559.52	2561.03	2560.97	2561.58	0.017129	5.94	13.30	10.72	0.94
WASH160	WASH160	655.73	100-Yr	79.00	2558.27	2559.92	2559.92	2560.59	0.020115	6.56	12.04	9.14	1.01
WASH160	WASH160	514.86	100-Yr	79.00	2553.97	2555.08	2555.43	2556.17	0.052905	8.37	9.44	17.62	2.02
WASH160	WASH160	338.33	100-Yr	79.00	2548.90	2549.27	2549.22	2549.34	0.023075	2.09	37.76	154.84	0.73
WASH160	WASH160	241.22	100-Yr	79.00	2544.77	2545.51	2545.45	2545.66	0.030301	3.08	25.64	62.80	0.85
WASH160	WASH160	84.23	100-Yr	79.00	2539.96	2540.35	2540.33	2540.44	0.036395	2.43	32.49	144.05	0.90
WASH180	WASH180	2258.25	100-Yr	45.00	2619.97	2621.27	2621.16	2621.57	0.024636	4.36	10.32	12.57	0.85
WASH180	WASH180	2081.05	100-Yr	45.00	2615.14	2616.93	2616.87	2617.24	0.024075	4.51	9.98	44.58	0.91
WASH180	WASH180	1966.66	100-Yr	45.00	2613.00	2613.41	2613.41	2613.57	0.043671	3.24	13.89	42.80	1.00
WASH180	WASH180	1847.09	100-Yr	45.00	2608.91	2609.31	2609.32	2609.45	0.027865	2.98	15.08	62.79	1.03
WASH180	WASH180	1641.95	100-Yr	45.00	2599.00	2600.18	2600.49	2601.07	0.063967	7.57	5.94	13.78	1.62
WASH180	WASH180	1484.69	100-Yr	45.00	2595.00	2596.28	2596.28	2596.55	0.016247	4.16	10.83	21.03	1.02
WASH180	WASH180	1403.09	100-Yr	45.00	2592.93	2593.36	2593.52	2593.86	0.096248	5.63	7.99	31.51	1.97
WASH180	WASH180	1332.58	100-Yr	45.00	2590.00	2590.80	2590.80	2591.00	0.024399	3.60	12.50	31.24	1.00
WASH180	WASH180	1198.56	100-Yr	45.00	2585.99	2586.70	2586.75	2586.90	0.039314	3.62	12.43	62.35	1.43
WASH180	WASH180	991.1	100-Yr	45.00	2578.74	2579.26	2579.23	2579.36	0.037922	2.48	18.11	66.24	0.84
WASH180	WASH180	825.42	100-Yr	45.00	2572.91	2573.47	2573.47	2573.58	0.032209	2.70	16.66	79.22	1.04
WASH180	WASH180	600.02	100-Yr	45.00	2564.79	2565.35	2565.42	2565.61	0.038887	4.07	11.04	34.50	1.27
WASH180	WASH180	392.61	100-Yr	45.00	2557.84	2558.68	2558.73	2559.02	0.026429	4.65	9.68	18.41	1.13
WASH180	WASH180	251.26	100-Yr	45.00	2551.11	2551.99	2552.22	2552.74	0.087712	6.94	6.48	12.72	1.71
WASH180	WASH180	139.68	100-Yr	45.00	2549.00	2549.43	2549.43	2549.62	0.035865	3.43	13.10	36.28	1.01
WASH180	WASH180	28.5	100-Yr	45.00	2543.97	2544.83	2545.00	2545.37	0.040087	5.87	7.67	14.40	1.42
WASH215	WASH215	1770.11	100-Yr	292.00	2609.17	2610.51	2610.51	2610.89	0.036125	4.96	58.84	79.39	1.02
WASH215	WASH215	1570.3	100-Yr	292.00	2599.96	2601.43	2601.68	2602.37	0.050929	7.78	37.55	38.66	1.39
WASH215	WASH215	1411.45	100-Yr	292.00	2593.98	2596.45	2596.45	2597.24	0.028426	7.13	40.96	26.39	1.01
WASH215	WASH215	1216.32	100-Yr	292.00	2587.00	2589.48	2589.74	2590.71	0.039572	8.90	32.81	19.55	1.21
WASH215	WASH215	1071.77	100-Yr	292.00	2582.59	2583.71	2583.81	2584.29	0.047031	6.10	47.87	58.29	1.19
WASH215	WASH215	952.43	100-Yr	292.00	2577.74	2578.81	2578.86	2579.37	0.036326	5.99	48.75	51.04	1.08
WASH215	WASH215	819.42	100-Yr	292.00	2572.82	2574.06	2574.17	2574.70	0.033880	6.43	45.44	49.79	1.19
WASH215	WASH215	661.36	100-Yr	292.00	2567.30	2568.28	2568.40	2568.87	0.040164	6.14	47.55	62.87	1.24
WASH215	WASH215	485.15	100-Yr	292.00	2561.69	2562.65	2562.65	2563.03	0.029014	4.94	59.07	79.63	1.01
WASH215	WASH215	357.34	100-Yr	292.00	2556.72	2557.88	2557.97	2558.36	0.047011	5.61	52.07	79.15	1.22
WASH215	WASH215	150.52	100-Yr	292.00	2549.92	2551.24	2551.24	2551.66	0.033100	5.18	56.32	69.85	1.02
WASH215	WASH215	22.86	100-Yr	292.00	2545.43	2547.08	2547.26	2547.89	0.026135	7.23	40.39	37.62	1.23

O SITE BOUNDARY CROSS SECTION

HEC-RAS Proposed Condition


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)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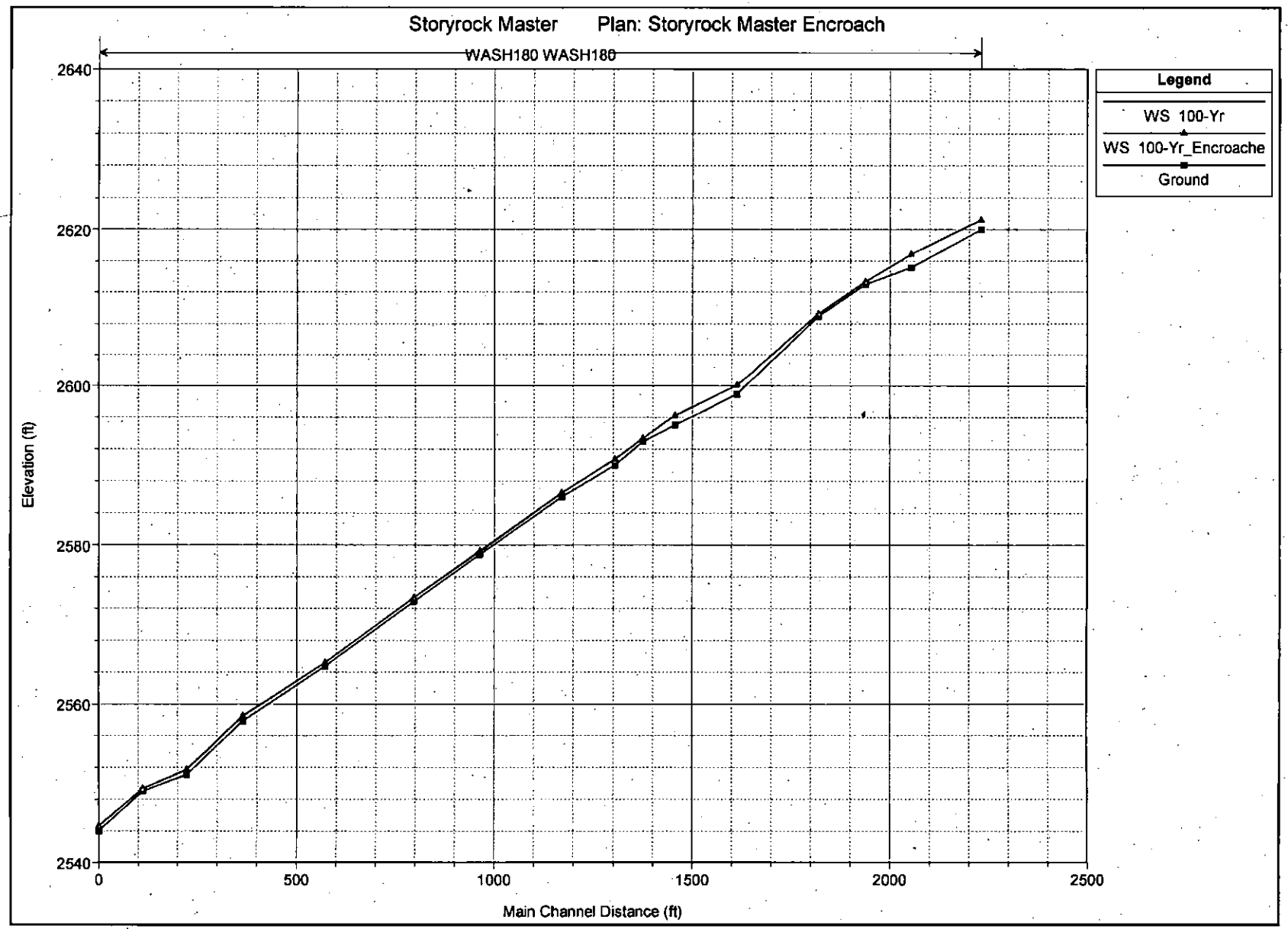
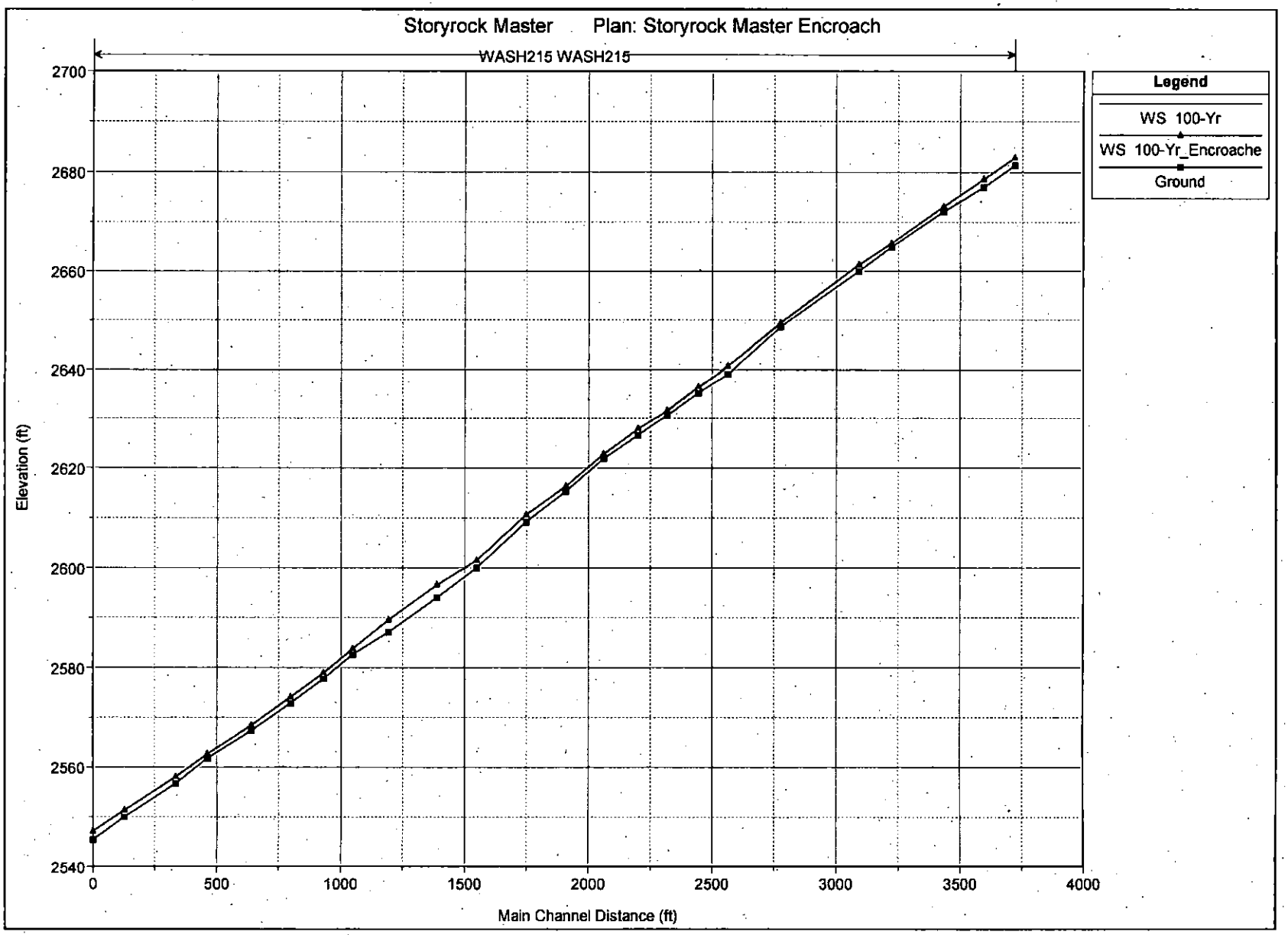
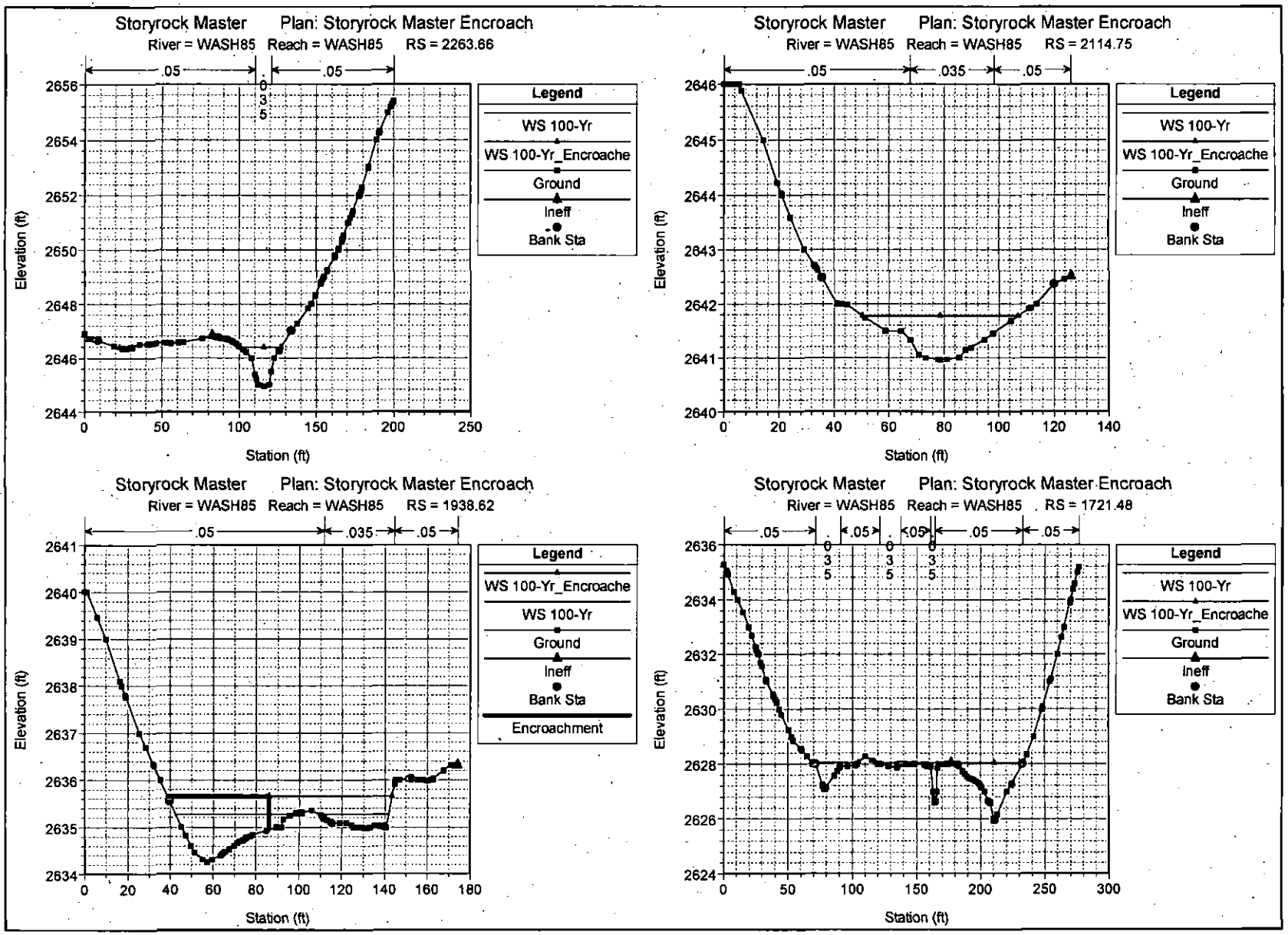
WASH160 WASH160
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Elevation (ft)
2640
2620
2600
2580
2560
2540
2520
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)


Storyrock Master Plan: Storyrock Master Encroach
WASH180 WASH180
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Elevation (ft)
2640
2620
2600
2580
2560
2540
0
500
1000
1500
2000
2500
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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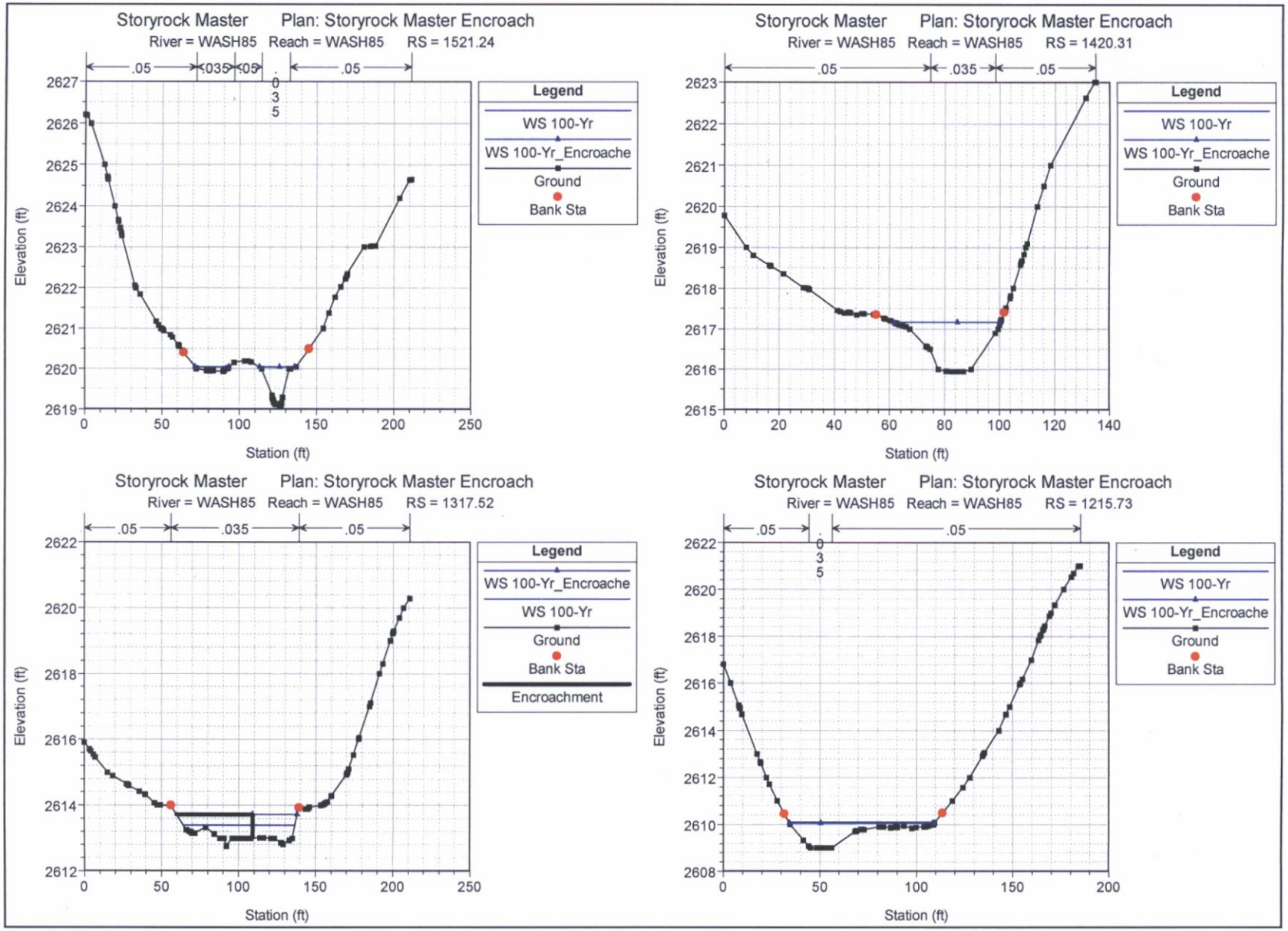
River = WASH85 Reach = WASH85 RS = 2263.66
.05
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 2114.75
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 1938.62
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Ineff
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 1721.48
.05
.05
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta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River = WASH85 Reach = WASH85 RS = 1521.24
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.035
.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 = 1420.31
.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 = 1317.52
.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 = WASH85 Reach = WASH85 RS = 1215.73
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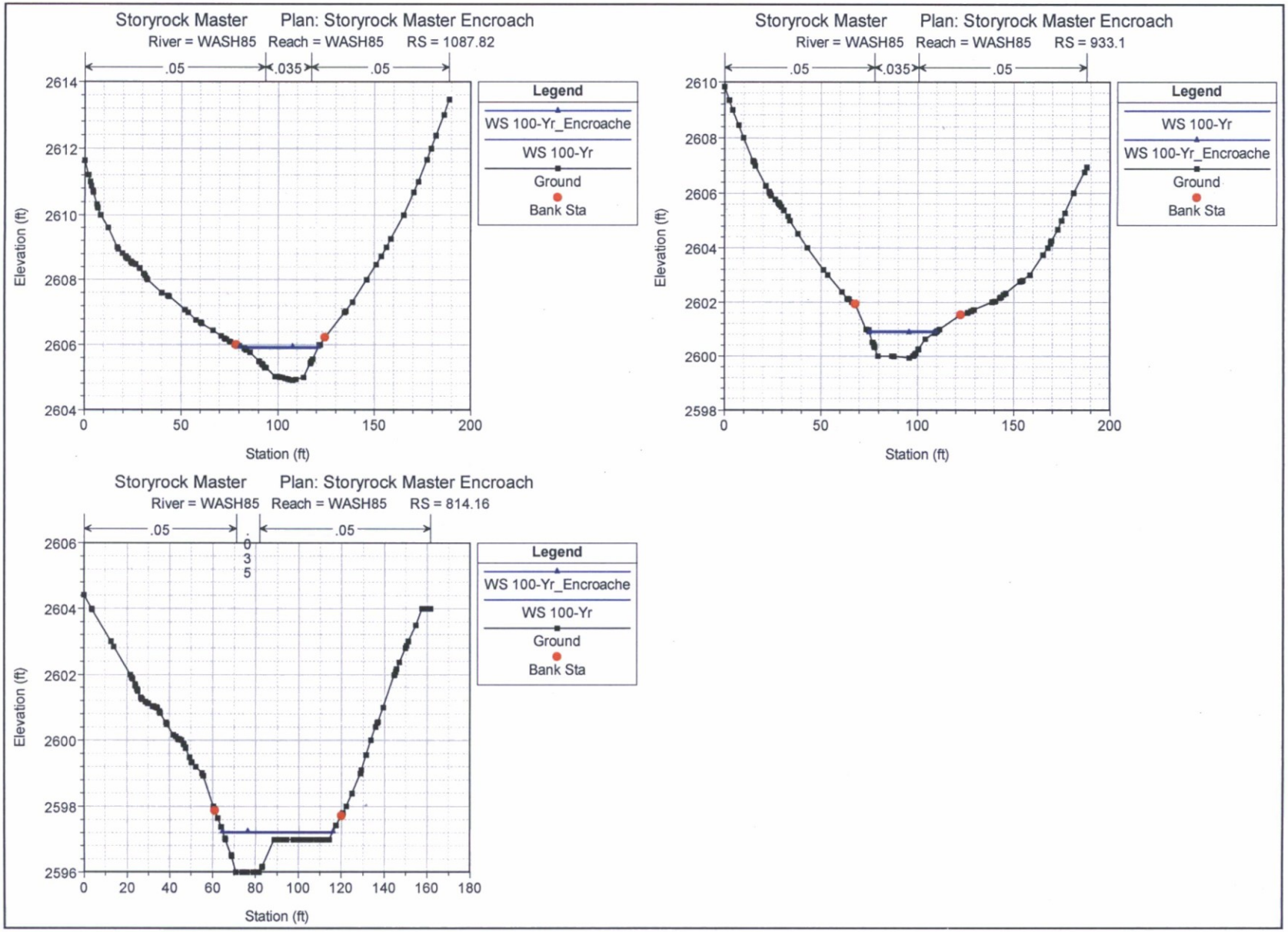
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)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River = WASH85 Reach = WASH85 RS = 1087.82
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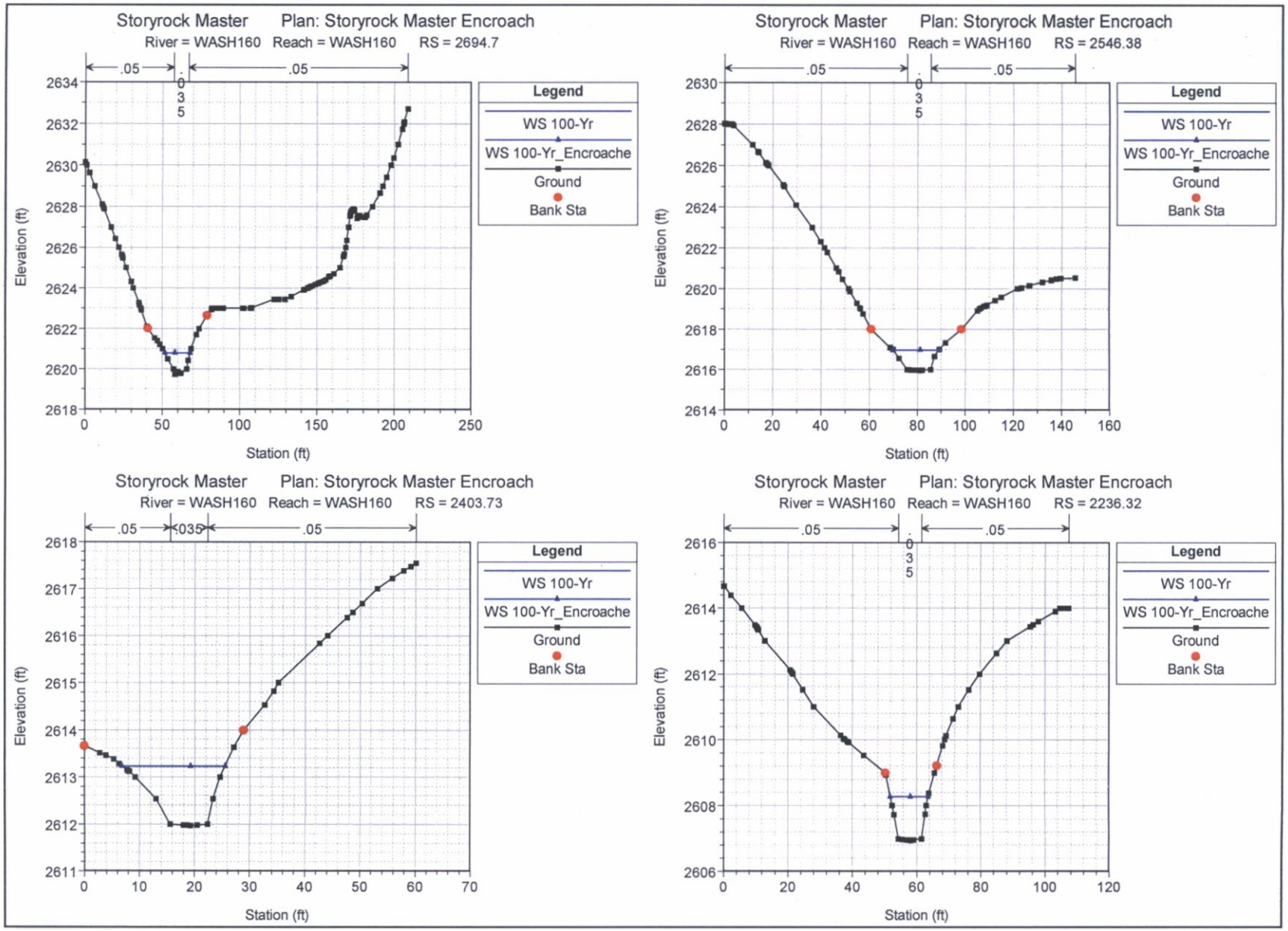
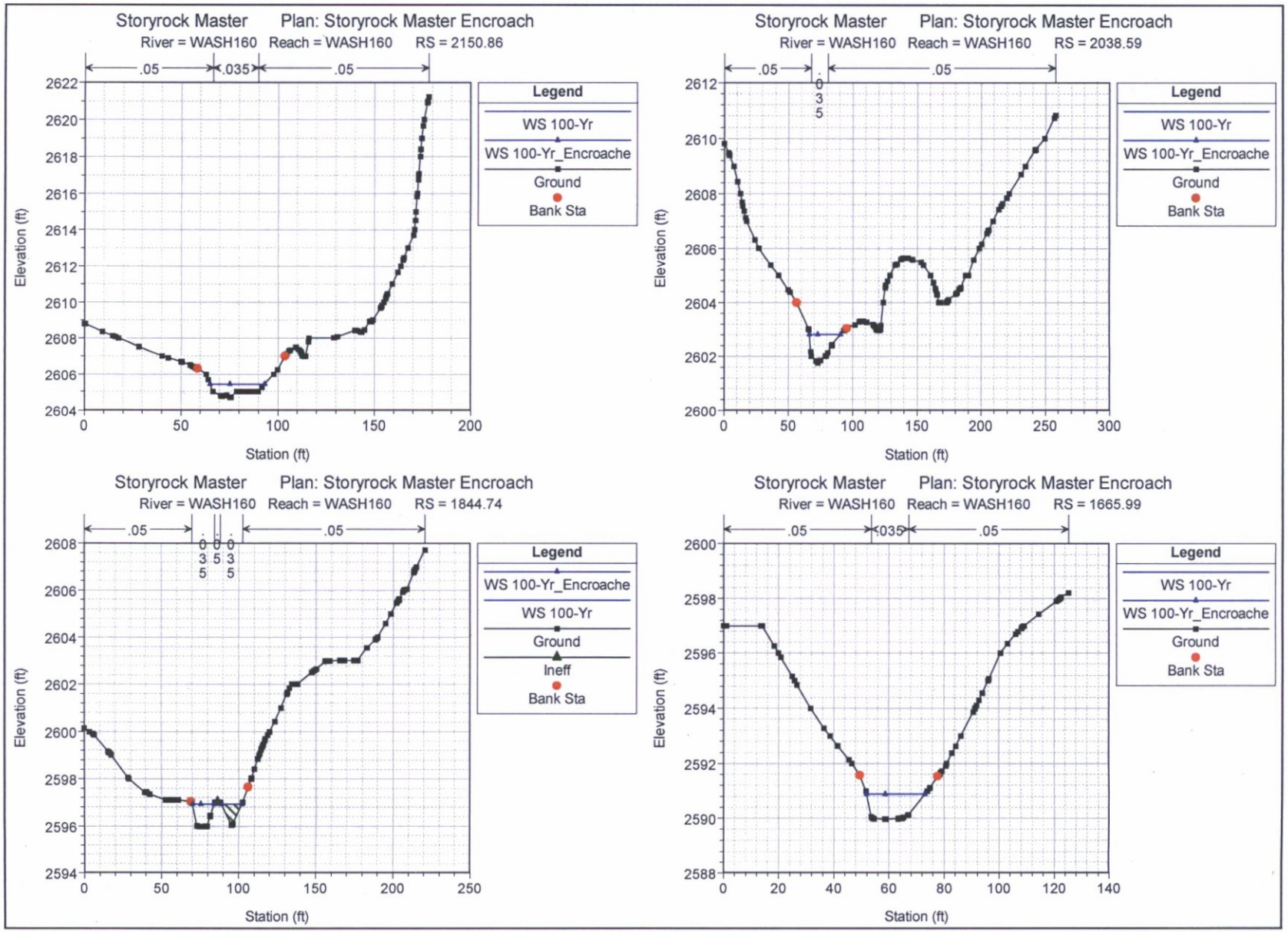
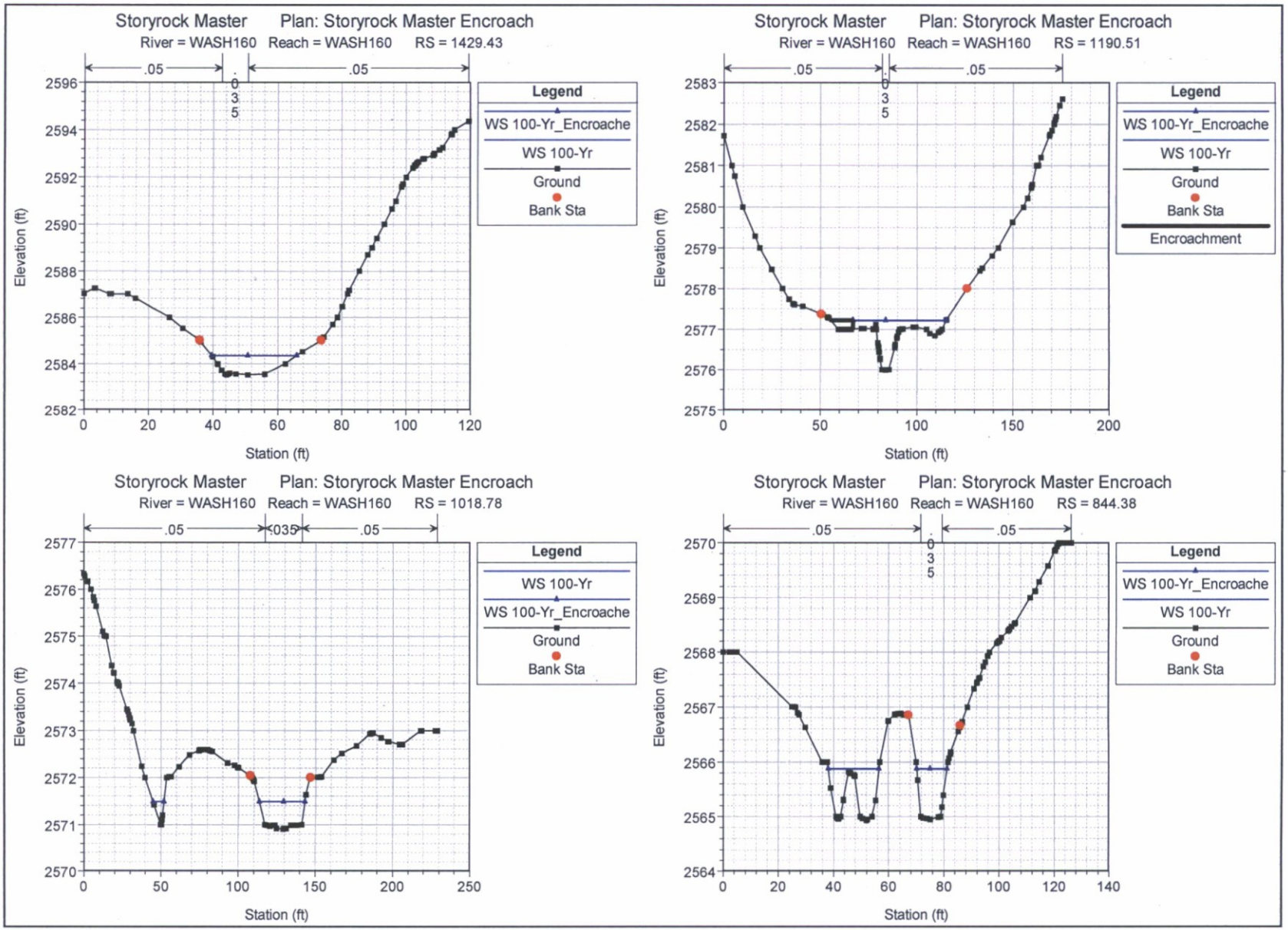
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 933.1
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH85 Reach = WASH85 RS = 814.16
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta


Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 2694.7
.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 = WASH160 Reach = WASH160 RS = 2546.38
.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 = WASH160 Reach = WASH160 RS = 2403.73
.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 = WASH160 Reach = WASH160 RS = 2236.32
.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 = WASH160 Reach = WASH160 RS = 2150.86
.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 = WASH160 Reach = WASH160 RS = 2038.59
.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 = WASH160 Reach = WASH160 RS = 1844.74
.05
.035
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 1665.99
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta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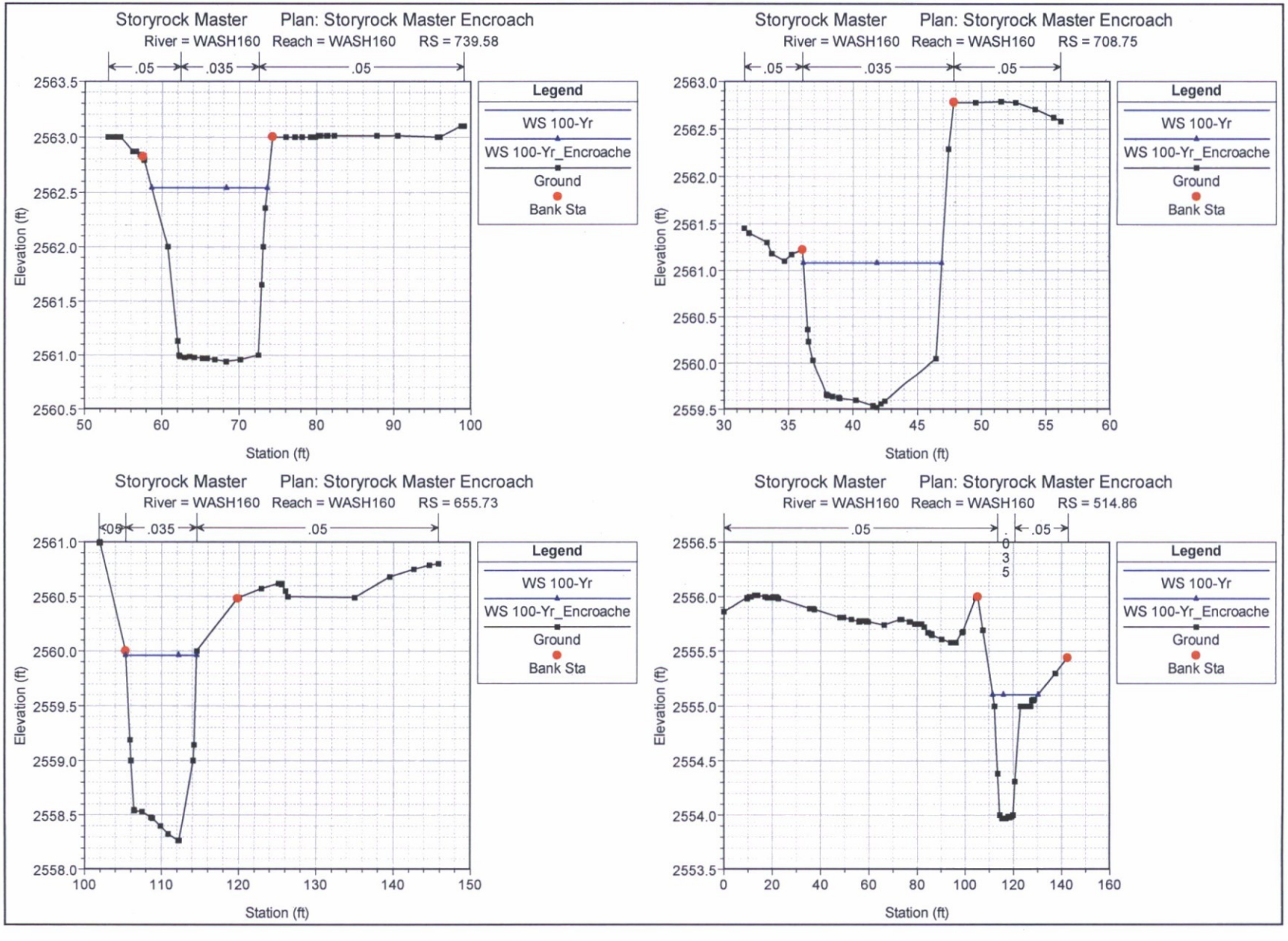
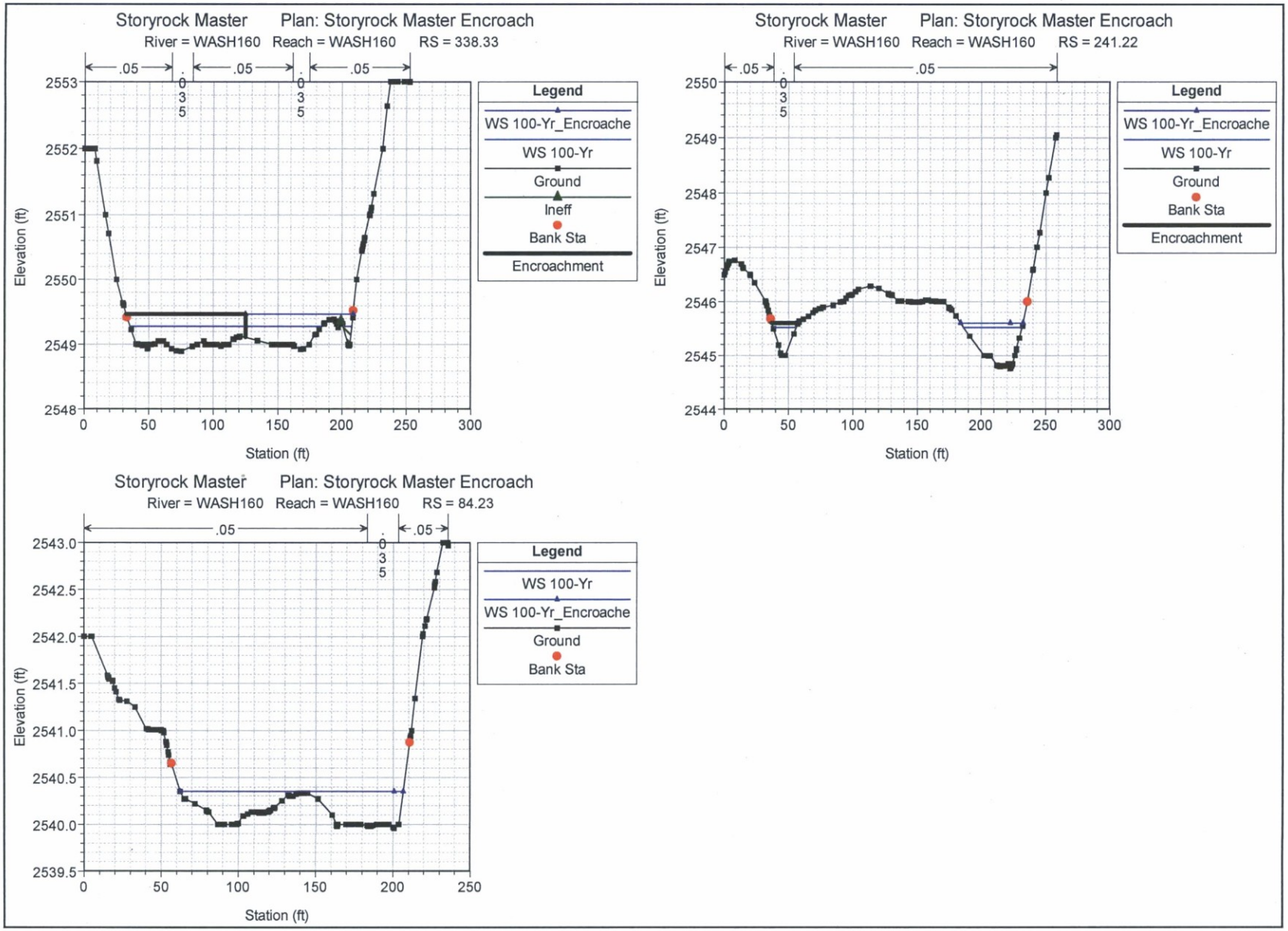
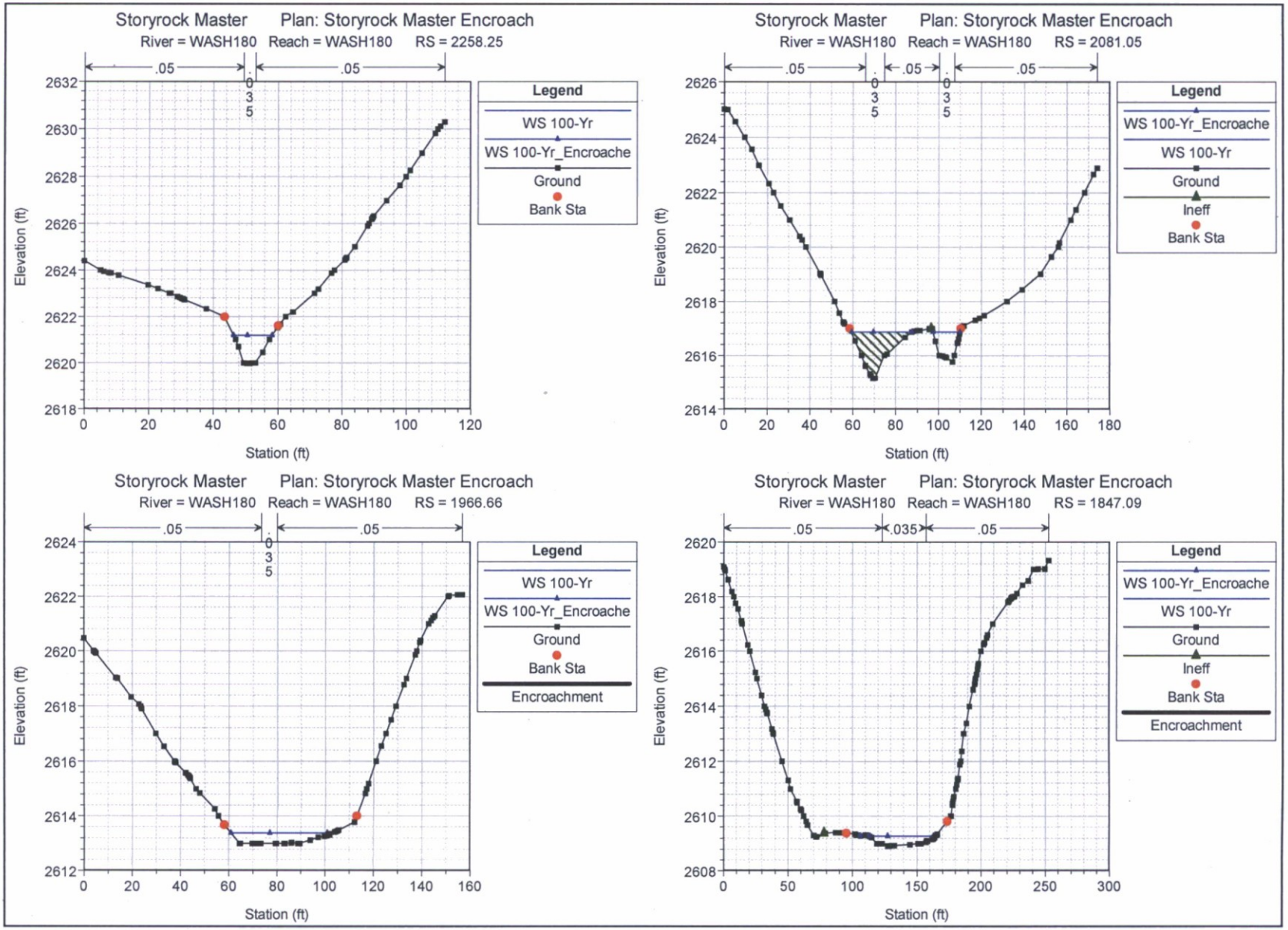
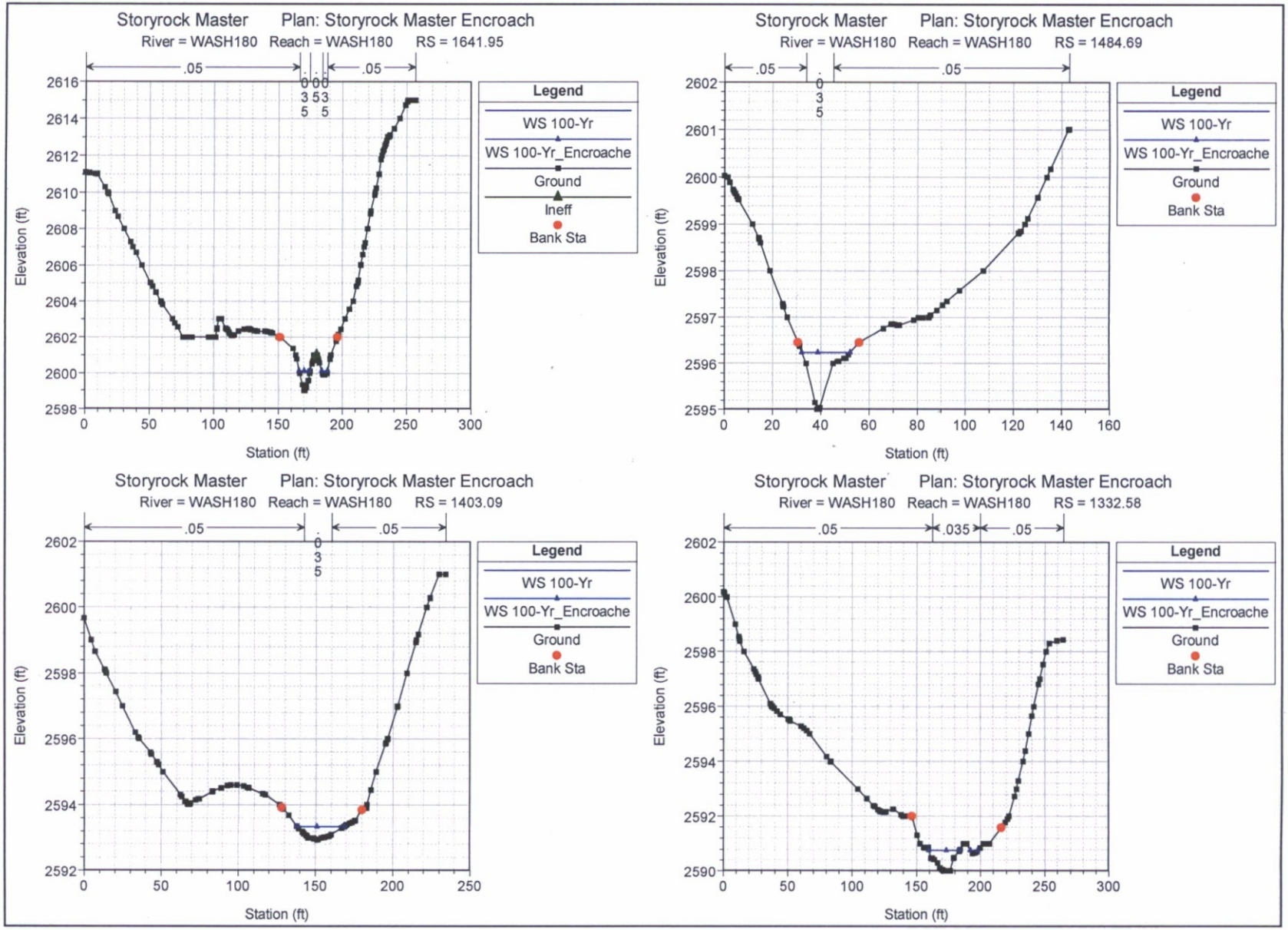
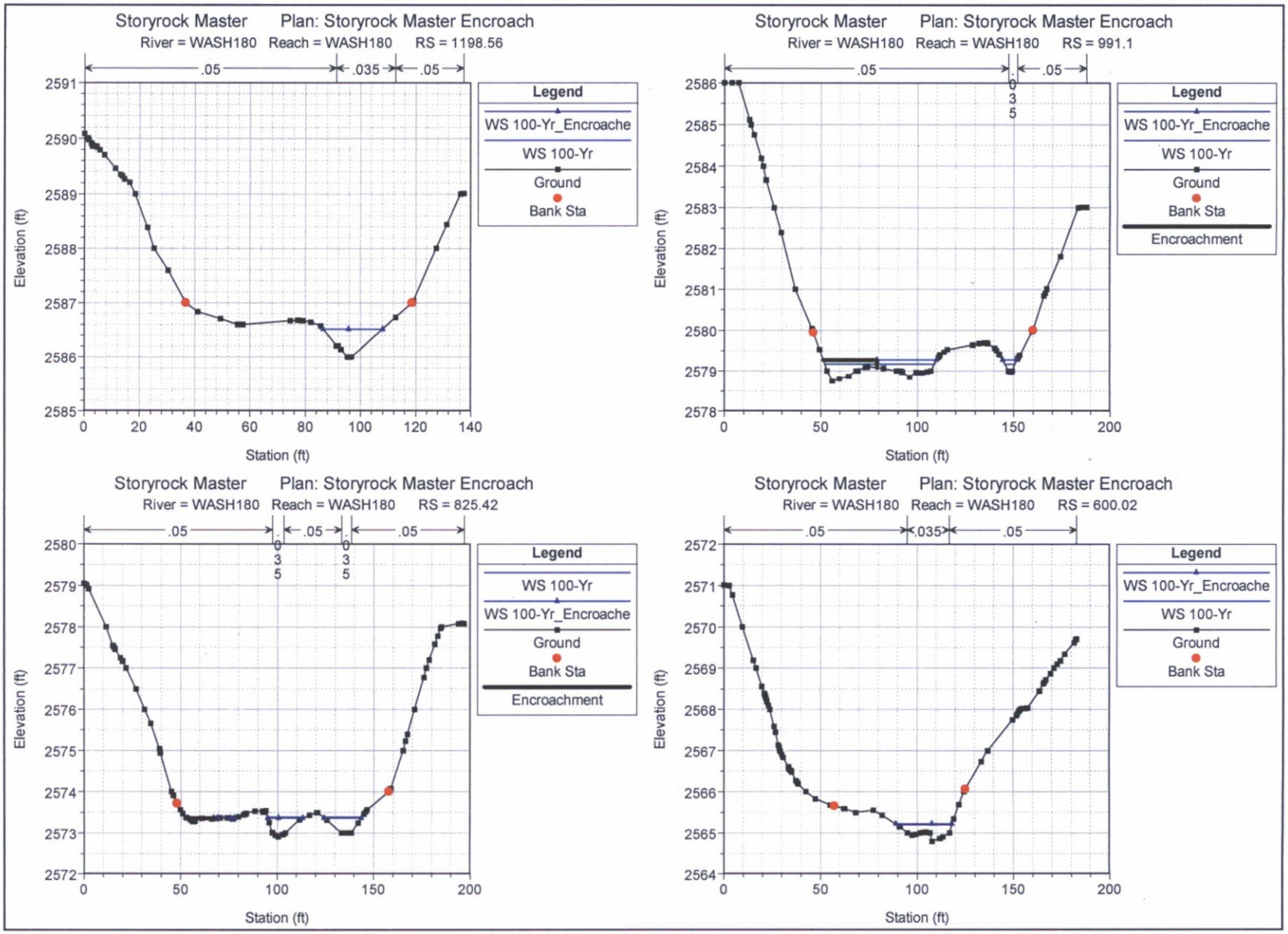
River = WASH160 Reach = WASH160 RS = 1429.43
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 1190.51
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 1018.78
.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 = WASH160 Reach = WASH160 RS = 844.38
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta

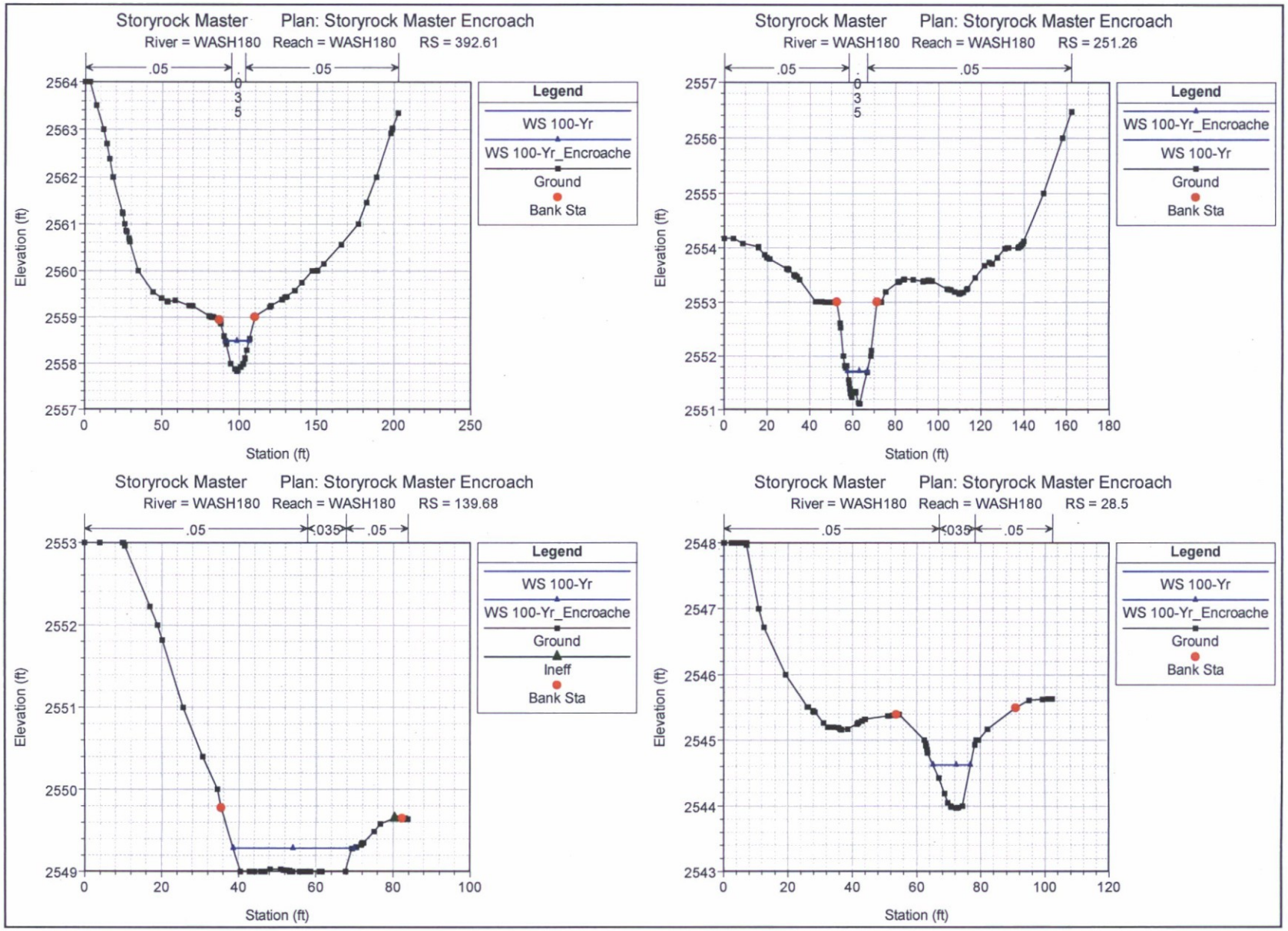

Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 739.58
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 708.75
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 655.73
.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 = WASH160 Reach = WASH160 RS = 514.86
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta

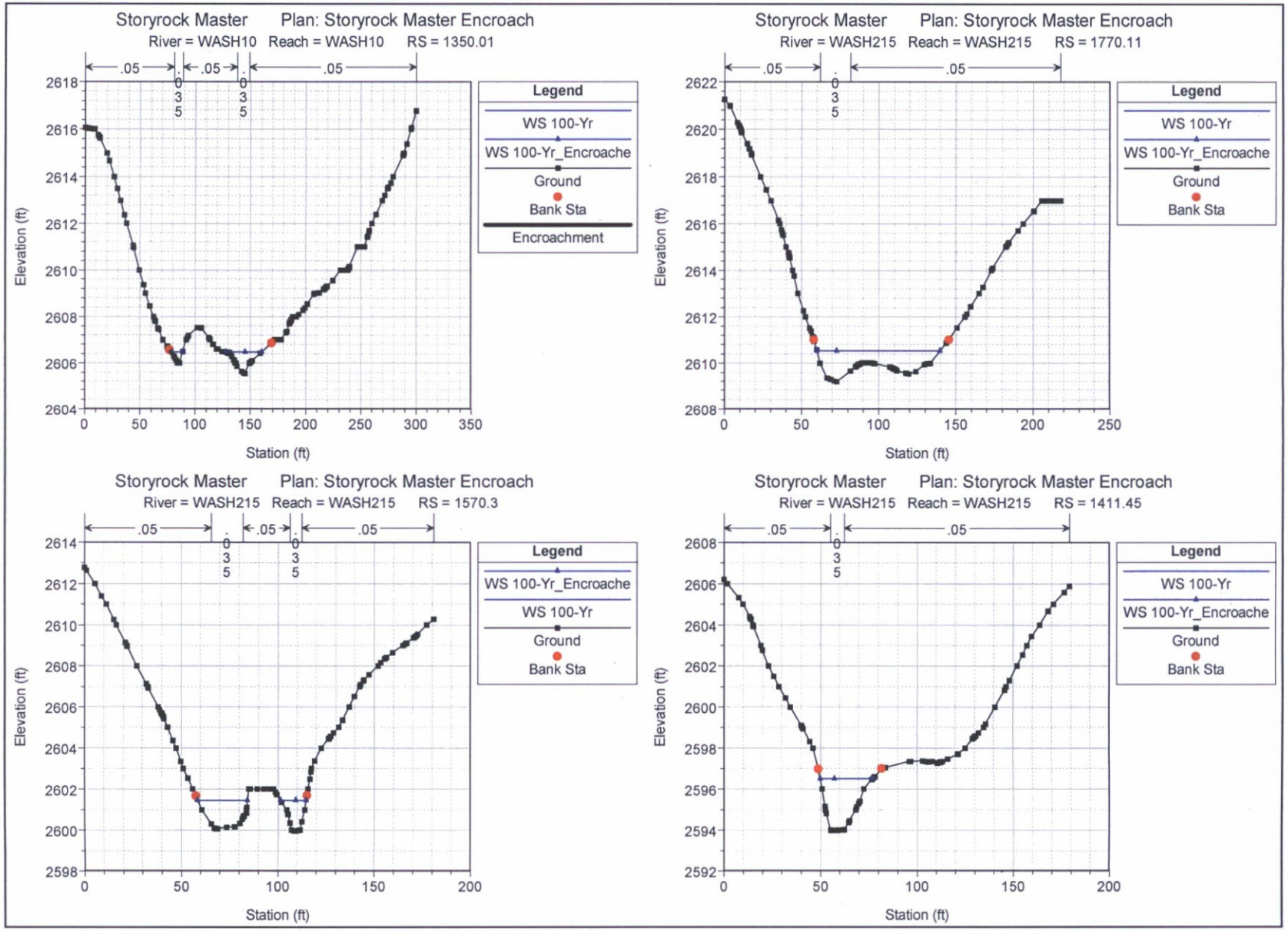

Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 338.33
.05
.05
.05
.035
.035
Elevation (ft)
2553
2552
2551
2550
2549
2548
0
50
100
150
200
250
300
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Ineff
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 241.22
.05
.05
.035
Elevation (ft)
2550
2549
2548
2547
2546
2545
2544
0
50
100
150
200
250
300
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH160 Reach = WASH160 RS = 84.23
.05
.05
.035
Elevation (ft)
2543.0
2542.5
2542.0
2541.5
2541.0
2540.5
2540.0
2539.5
0
50
100
150
200
250
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta

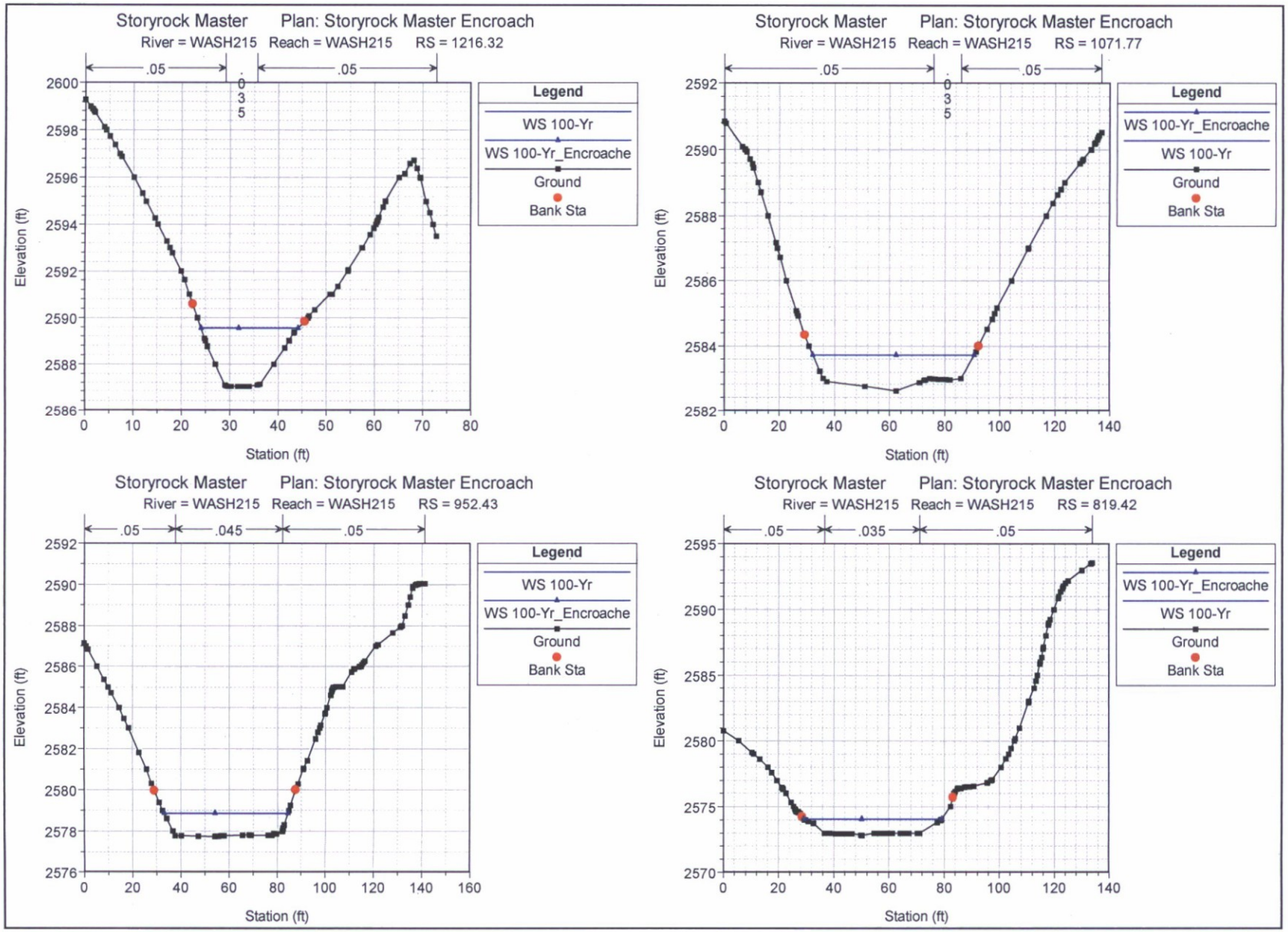

Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 2258.25
.05
.05
0
3
5
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 2081.05
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Ineff
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 1966.66
.05
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 1847.09
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Ineff
Bank Sta
Encroachment

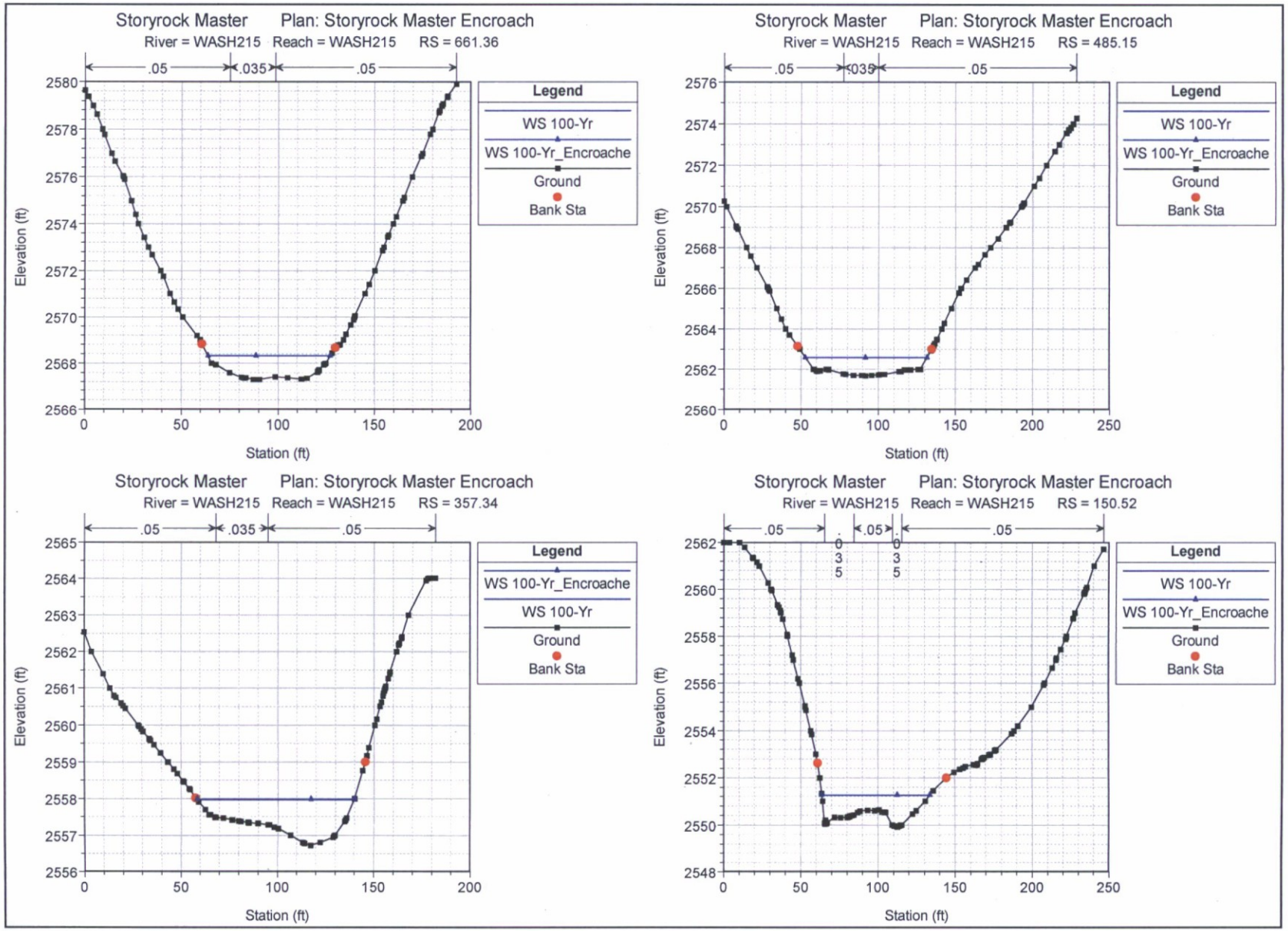

Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 1641.95
.05
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 1484.69
.05
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 1403.09
.05
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 1332.58
.05
.035
.05
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Elevation (ft)
Station (ft)

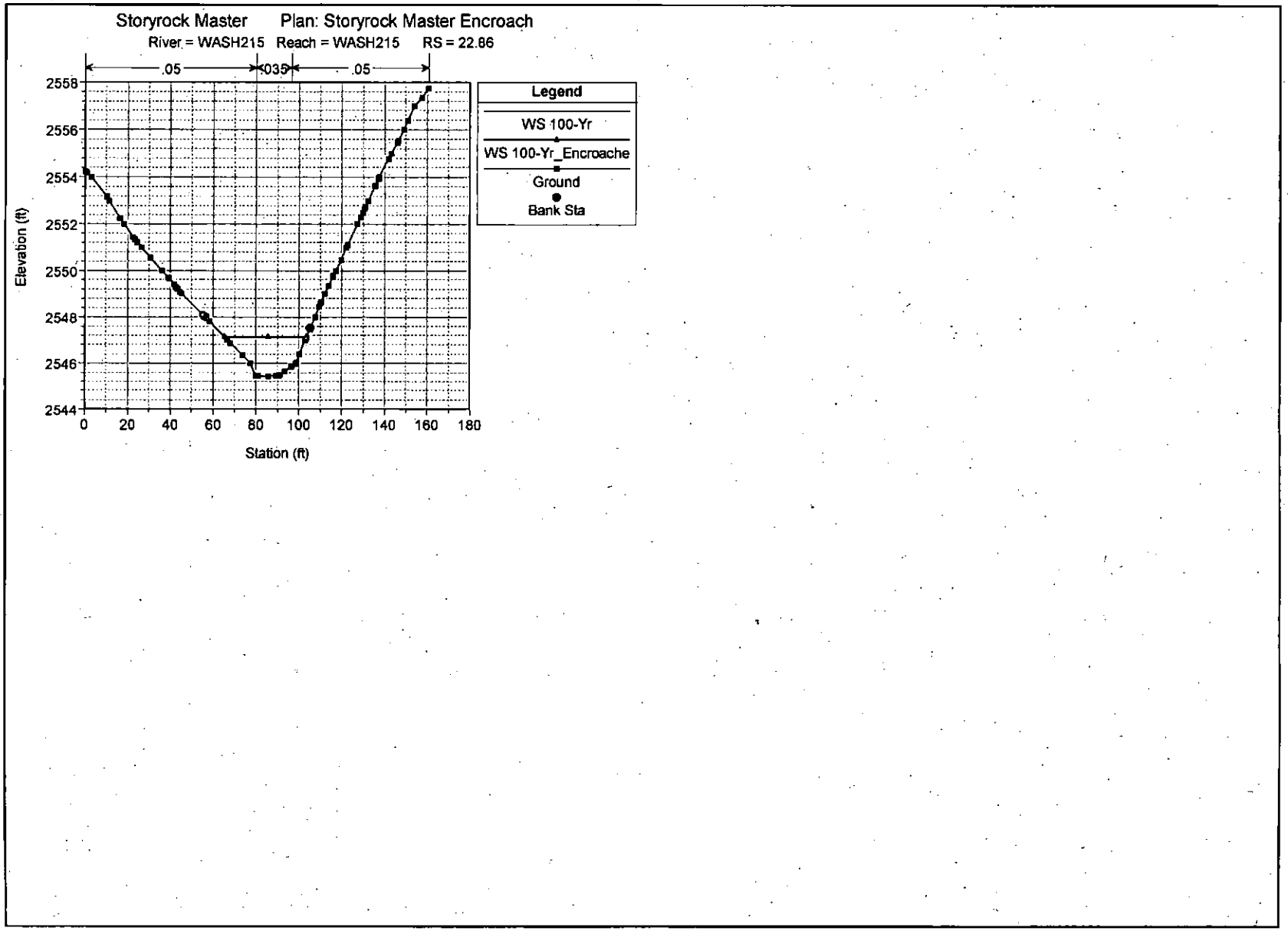

Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 1198.56
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 991.1
.05
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 825.42
.05
.05
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta
Encroachment
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 600.02
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta


Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 392.61
.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 = WASH180 Reach = WASH180 RS = 251.26
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Storyrock Master Plan: Storyrock Master Encroach
River = WASH180 Reach = WASH180 RS = 139.68
.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 = WASH180 Reach = WASH180 RS = 28.5
.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 = WASH10 Reach = WASH10 RS = 1350.01
.05
.05
.05
.035
.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 = 1770.11
.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 = WASH215 Reach = WASH215 RS = 1570.3
.05
.05
.05
.035
.035
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH215 Reach = WASH215 RS = 1411.45
.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 = WASH215 Reach = WASH215 RS = 1216.32
.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 = 1071.77
.05
.035
.05
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH215 Reach = WASH215 RS = 952.43
.05
.045
.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 = 819.42
.05
.035
.05
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


Storyrock Master Plan: Storyrock Master Encroach
River = WASH215 Reach = WASH215 RS = 661.36
.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 = 485.15
.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 = 357.34
.05
.035
.05
Legend
WS 100-Yr_Encroache
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
Storyrock Master Plan: Storyrock Master Encroach
River = WASH215 Reach = WASH215 RS = 150.52
.05
.035
.05
.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 = 22.86
.05
.035
.05
Elevation (ft)
2558
2556
2554
2552
2550
2548
2546
2544
0
20
40
60
80
100
120
140
160
180
Station (ft)
Legend
WS 100-Yr
WS 100-Yr_Encroache
Ground
Bank Sta

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)	
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
WASH85	WASH85	2114.75	100-Yr	133.00	2640.97	2641.77	2641.90	2642.21	0.037910	5.33	24.93	56.52	1.42
WASH85	WASH85	2114.75	100-Yr_Encroache	133.00	2640.97	2641.77	2641.90	2642.21	0.037910	5.33	24.93	56.52	1.42
WASH85	WASH85	1938.62	100-Yr	133.00	2634.26	2635.27	2635.27	2635.48	0.039503	3.66	36.32	87.71	1.00
WASH85	WASH85	1938.62	100-Yr_Encroache	133.00	2634.95	2635.65	2635.68	2635.96	0.032925	4.48	29.70	57.39	1.10
WASH85	WASH85	1721.48	100-Yr	133.00	2625.94	2628.04	2628.04	2628.10	0.011727	2.02	66.09	151.35	0.53
WASH85	WASH85	1721.48	100-Yr_Encroache	133.00	2625.94	2628.04	2628.04	2628.10	0.011727	2.02	66.09	151.35	0.53
WASH85	WASH85	1521.24	100-Yr	133.00	2619.06	2620.04	2620.39	2621.96	0.177883	11.14	11.94	44.61	3.79
WASH85	WASH85	1521.24	100-Yr_Encroache	133.00	2619.06	2620.04	2620.39	2621.96	0.177883	11.14	11.94	44.61	3.79
WASH85	WASH85	1420.31	100-Yr	133.00	2615.94	2617.16	2617.17	2617.53	0.016802	4.88	27.23	38.78	1.03
WASH85	WASH85	1420.31	100-Yr_Encroache	133.00	2615.94	2617.16	2617.17	2617.53	0.016802	4.88	27.23	38.78	1.03
WASH85	WASH85	1317.52	100-Yr	153.00	2612.77	2613.39	2613.57	2613.98	0.087055	6.15	24.86	72.09	1.85
WASH85	WASH85	1317.52	100-Yr_Encroache	153.00	2612.82	2613.72	2614.01	2614.59	0.050705	7.49	20.43	28.66	1.56
WASH85	WASH85	1215.73	100-Yr	153.00	2609.00	2610.10	2610.10	2610.36	0.024562	4.10	37.35	75.81	1.03
WASH85	WASH85	1215.73	100-Yr_Encroache	153.00	2609.00	2610.05	2610.10	2610.38	0.032038	4.57	33.50	74.96	1.20
WASH85	WASH85	1087.82	100-Yr	153.00	2604.91	2605.90	2606.09	2606.54	0.036256	6.45	23.72	37.87	1.44
WASH85	WASH85	1087.82	100-Yr_Encroache	153.00	2604.91	2605.95	2606.09	2606.49	0.028652	5.89	25.97	40.48	1.30
WASH85	WASH85	933.1	100-Yr	153.00	2599.93	2600.94	2601.10	2601.53	0.028952	6.17	24.80	35.35	1.30
WASH85	WASH85	933.1	100-Yr_Encroache	153.00	2599.93	2600.89	2601.09	2601.57	0.035246	6.63	23.09	34.43	1.43
WASH85	WASH85	814.16	100-Yr	153.00	2596.00	2597.19	2597.33	2597.72	0.035255	5.80	26.38	50.90	1.42
WASH85	WASH85	814.16	100-Yr_Encroache	153.00	2596.00	2597.24	2597.33	2597.68	0.029494	5.36	28.54	51.44	1.27
WASH160	WASH160	2694.7	100-Yr	70.00	2619.72	2620.79	2620.95	2621.41	0.035115	6.35	11.03	16.14	1.35
WASH160	WASH160	2694.7	100-Yr_Encroache	70.00	2619.72	2620.79	2620.95	2621.41	0.035115	6.35	11.03	16.14	1.35
WASH160	WASH160	2546.38	100-Yr	70.00	2615.97	2616.97	2617.00	2617.37	0.021139	5.05	13.86	18.94	1.04
WASH160	WASH160	2546.38	100-Yr_Encroache	70.00	2615.97	2616.97	2616.99	2617.37	0.021158	5.05	13.86	18.94	1.04
WASH160	WASH160	2403.73	100-Yr	70.00	2611.97	2613.23	2613.20	2613.59	0.029929	4.79	14.61	18.69	0.96
WASH160	WASH160	2403.73	100-Yr_Encroache	70.00	2611.97	2613.23	2613.20	2613.59	0.029929	4.79	14.61	18.69	0.96
WASH160	WASH160	2236.32	100-Yr	70.00	2606.95	2608.27	2608.27	2608.79	0.027353	5.77	12.14	11.84	1.00
WASH160	WASH160	2236.32	100-Yr_Encroache	70.00	2606.95	2608.27	2608.27	2608.79	0.027353	5.77	12.14	11.84	1.00
WASH160	WASH160	2150.86	100-Yr	70.00	2604.69	2605.42	2605.54	2605.87	0.042990	5.36	13.05	28.30	1.39
WASH160	WASH160	2150.86	100-Yr_Encroache	70.00	2604.69	2605.42	2605.54	2605.87	0.043131	5.37	13.03	28.30	1.39
WASH160	WASH160	2038.59	100-Yr	70.00	2601.77	2602.81	2602.81	2603.14	0.018448	4.55	15.38	24.42	1.01
WASH160	WASH160	2038.59	100-Yr_Encroache	70.00	2601.77	2602.81	2602.81	2603.14	0.018467	4.55	15.38	24.41	1.01
WASH160	WASH160	1844.74	100-Yr	70.00	2595.97	2596.93	2597.02	2597.72	0.046114	7.13	9.82	27.41	1.50
WASH160	WASH160	1844.74	100-Yr_Encroache	70.00	2595.97	2596.94	2597.02	2597.72	0.046024	7.12	9.83	27.42	1.50
WASH160	WASH160	1665.99	100-Yr	70.00	2589.97	2590.88	2590.88	2591.22	0.026933	4.68	14.96	21.30	0.98
WASH160	WASH160	1665.99	100-Yr_Encroache	70.00	2589.97	2590.88	2590.87	2591.22	0.027163	4.69	14.92	21.28	0.99
WASH160	WASH160	1429.43	100-Yr	70.00	2583.51	2584.34	2584.34	2584.65	0.028594	4.43	15.80	26.23	1.01
WASH160	WASH160	1429.43	100-Yr_Encroache	70.00	2583.51	2584.34	2584.34	2584.65	0.028366	4.42	15.85	26.26	1.00
WASH160	WASH160	1190.51	100-Yr	70.00	2575.99	2577.20	2577.22	2577.40	0.031717	3.64	19.21	59.40	1.13
WASH160	WASH160	1190.51	100-Yr_Encroache	70.00	2575.99	2577.21	2577.25	2577.45	0.031463	3.89	17.97	48.32	1.13
WASH160	WASH160	1018.78	100-Yr	70.00	2570.91	2571.49	2571.56	2571.82	0.033633	4.76	15.69	36.45	1.23
WASH160	WASH160	1018.78	100-Yr_Encroache	70.00	2570.91	2571.48	2571.56	2571.83	0.034422	4.80	15.57	36.36	1.24
WASH160	WASH160	844.38	100-Yr	83.00	2564.95	2565.87	2565.91	2566.22	0.034366	5.47	18.54	29.36	1.12
WASH160	WASH160	844.38	100-Yr_Encroache	83.00	2564.95	2565.87	2565.91	2566.22	0.033723	5.43	18.66	29.40	1.11
WASH160	WASH160	739.58	100-Yr	83.00	2560.94	2562.54	2562.19	2562.84	0.011687	4.37	18.99	14.99	0.68
WASH160	WASH160	739.58	100-Yr_Encroache	83.00	2560.94	2562.54	2562.19	2562.84	0.011687	4.37	18.99	14.99	0.68
WASH160	WASH160	708.75	100-Yr	83.00	2559.52	2561.08	2561.02	2561.64	0.016944	6.02	13.79	10.76	0.94
WASH160	WASH160	708.75	100-Yr_Encroache	83.00	2559.52	2561.08	2561.02	2561.64	0.016944	6.02	13.79	10.76	0.94
WASH160	WASH160	655.73	100-Yr	83.00	2558.27	2559.96	2559.96	2560.65	0.020068	6.66	12.46	9.19	1.01
WASH160	WASH160	655.73	100-Yr_Encroache	83.00	2558.27	2559.96	2559.96	2560.65	0.020068	6.66	12.46	9.19	1.01
WASH160	WASH160	514.86	100-Yr	83.00	2553.97	2555.10	2555.45	2556.20	0.053459	8.40	9.88	18.67	2.04
WASH160	WASH160	514.86	100-Yr_Encroache	83.00	2553.97	2555.10	2555.45	2556.20	0.053459	8.40	9.88	18.67	2.04
WASH160	WASH160	338.33	100-Yr	83.00	2548.90	2549.28	2549.23	2549.35	0.022937	2.12	39.06	155.95	0.73
WASH160	WASH160	338.33	100-Yr_Encroache	83.00	2548.93	2549.47	2549.42	2549.59	0.023742	2.73	30.39	83.54	0.80
WASH160	WASH160	241.22	100-Yr	83.00	2544.77	2545.52	2545.47	2545.67	0.030227	3.12	26.57	63.81	0.85
WASH160	WASH160	241.22	100-Yr_Encroache	83.00	2544.77	2545.60	2545.53	2545.78	0.031461	3.36	24.72	48.59	0.83

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

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
WASH160	WASH160	84.23	100-Yr	83.00	2539.96	2540.35	2540.33	2540.45	0.036432	2.47	33.55	144.28	0.90
WASH160	WASH160	84.23	100-Yr_Encroache	83.00	2539.96	2540.35	2540.33	2540.45	0.036432	2.47	33.55	144.28	0.90
WASH180	WASH180	2258.25	100-Yr	40.00	2619.97	2621.19	2621.09	2621.48	0.024788	4.27	9.37	11.94	0.85
WASH180	WASH180	2258.25	100-Yr_Encroache	40.00	2619.97	2621.19	2621.09	2621.48	0.025339	4.31	9.29	11.89	0.86
WASH180	WASH180	2081.05	100-Yr	40.00	2615.14	2616.86	2616.81	2617.16	0.023915	4.36	9.17	40.50	0.90
WASH180	WASH180	2081.05	100-Yr_Encroache	40.00	2615.14	2616.87	2616.81	2617.16	0.023421	4.33	9.24	40.64	0.89
WASH180	WASH180	1966.66	100-Yr	40.00	2613.00	2613.39	2613.38	2613.53	0.042456	3.08	12.97	42.22	0.98
WASH180	WASH180	1966.66	100-Yr_Encroache	40.00	2613.00	2613.38	2613.38	2613.54	0.043787	3.17	12.61	39.93	0.99
WASH180	WASH180	1847.09	100-Yr	40.00	2608.91	2609.28	2609.28	2609.41	0.028480	2.94	13.62	54.73	1.01
WASH180	WASH180	1847.09	100-Yr_Encroache	40.00	2608.91	2609.28	2609.28	2609.42	0.027832	2.93	13.66	50.52	0.99
WASH180	WASH180	1641.95	100-Yr	41.00	2599.00	2600.13	2600.42	2600.99	0.062179	7.42	5.52	13.09	1.62
WASH180	WASH180	1641.95	100-Yr_Encroache	41.00	2599.00	2600.12	2600.42	2601.00	0.063985	7.53	5.45	12.97	1.64
WASH180	WASH180	1484.69	100-Yr	41.00	2595.00	2596.24	2596.24	2596.50	0.016247	4.10	10.01	20.08	1.02
WASH180	WASH180	1484.69	100-Yr_Encroache	41.00	2595.00	2596.24	2596.24	2596.50	0.016247	4.10	10.01	20.08	1.02
WASH180	WASH180	1403.09	100-Yr	41.00	2592.93	2593.35	2593.50	2593.81	0.095826	5.49	7.47	30.91	1.97
WASH180	WASH180	1403.09	100-Yr_Encroache	41.00	2592.93	2593.35	2593.50	2593.81	0.095826	5.49	7.47	30.91	1.97
WASH180	WASH180	1332.58	100-Yr	41.00	2590.00	2590.76	2590.76	2590.96	0.024678	3.56	11.50	29.52	1.01
WASH180	WASH180	1332.58	100-Yr_Encroache	41.00	2590.00	2590.76	2590.76	2590.96	0.025119	3.59	11.42	29.37	1.02
WASH180	WASH180	1198.56	100-Yr	24.00	2585.99	2586.51	2586.56	2586.77	0.050539	4.07	5.90	21.43	1.37
WASH180	WASH180	1198.56	100-Yr_Encroache	24.00	2585.99	2586.51	2586.63	2586.76	0.048492	4.00	5.99	21.60	1.34
WASH180	WASH180	991.1	100-Yr	24.00	2578.74	2579.15	2579.15	2579.23	0.055257	2.22	10.80	61.68	0.94
WASH180	WASH180	991.1	100-Yr_Encroache	24.00	2578.84	2579.26	2579.24	2579.36	0.046440	2.57	9.33	38.43	0.92
WASH180	WASH180	825.42	100-Yr	24.00	2572.91	2573.38	2573.38	2573.46	0.023844	2.31	10.41	64.28	1.01
WASH180	WASH180	825.42	100-Yr_Encroache	24.00	2572.91	2573.36	2573.36	2573.47	0.028132	2.62	9.15	40.99	0.98
WASH180	WASH180	600.02	100-Yr	24.00	2564.79	2565.20	2565.27	2565.43	0.058579	3.87	6.20	28.30	1.46
WASH180	WASH180	600.02	100-Yr_Encroache	24.00	2564.79	2565.22	2565.27	2565.42	0.046777	3.59	6.69	28.99	1.32
WASH180	WASH180	392.61	100-Yr	24.00	2557.84	2558.49	2558.49	2558.71	0.022101	3.71	6.47	15.42	1.01
WASH180	WASH180	392.61	100-Yr_Encroache	24.00	2557.84	2558.48	2558.49	2558.71	0.023712	3.81	6.31	15.25	1.04
WASH180	WASH180	251.26	100-Yr	24.00	2551.11	2551.71	2551.95	2552.52	0.120751	7.22	3.32	9.21	2.12
WASH180	WASH180	251.26	100-Yr_Encroache	24.00	2551.11	2551.72	2551.96	2552.46	0.106535	6.89	3.49	9.36	1.99
WASH180	WASH180	139.68	100-Yr	24.00	2549.00	2549.29	2549.29	2549.42	0.042070	2.93	8.19	31.25	1.01
WASH180	WASH180	139.68	100-Yr_Encroache	24.00	2549.00	2549.29	2549.29	2549.42	0.042070	2.93	8.19	31.25	1.01
WASH180	WASH180	28.5	100-Yr	24.00	2543.97	2544.63	2544.72	2544.99	0.037318	4.86	4.94	11.71	1.32
WASH180	WASH180	28.5	100-Yr_Encroache	24.00	2543.97	2544.63	2544.72	2544.99	0.037318	4.86	4.94	11.71	1.32
WASH215	WASH215	1770.11	100-Yr	308.00	2609.17	2610.54	2610.54	2610.93	0.036080	5.06	60.92	79.80	1.02
WASH215	WASH215	1770.11	100-Yr_Encroache	308.00	2609.17	2610.54	2610.54	2610.93	0.036080	5.06	60.92	79.80	1.02
WASH215	WASH215	1570.3	100-Yr	308.00	2599.96	2601.46	2601.73	2602.43	0.051031	7.89	39.03	39.18	1.39
WASH215	WASH215	1570.3	100-Yr_Encroache	308.00	2599.96	2601.47	2601.73	2602.43	0.050695	7.87	39.13	39.21	1.39
WASH215	WASH215	1411.45	100-Yr	308.00	2593.98	2596.53	2596.53	2597.32	0.028193	7.15	43.10	27.37	1.00
WASH215	WASH215	1411.45	100-Yr_Encroache	308.00	2593.98	2596.53	2596.53	2597.32	0.028193	7.15	43.10	27.37	1.00
WASH215	WASH215	1216.32	100-Yr	308.00	2587.00	2589.55	2589.81	2590.81	0.039592	9.00	34.24	20.00	1.21
WASH215	WASH215	1216.32	100-Yr_Encroache	308.00	2587.00	2589.55	2589.81	2590.81	0.039691	9.00	34.20	19.99	1.21
WASH215	WASH215	1071.77	100-Yr	308.00	2582.59	2583.74	2583.85	2584.34	0.047754	6.25	49.29	58.57	1.20
WASH215	WASH215	1071.77	100-Yr_Encroache	308.00	2582.59	2583.74	2583.85	2584.34	0.047624	6.24	49.33	58.58	1.20
WASH215	WASH215	952.43	100-Yr	308.00	2577.74	2578.85	2578.90	2579.43	0.035759	6.07	50.70	51.30	1.08
WASH215	WASH215	952.43	100-Yr_Encroache	308.00	2577.74	2578.85	2578.90	2579.43	0.035841	6.08	50.67	51.30	1.08
WASH215	WASH215	819.42	100-Yr	308.00	2572.82	2574.09	2574.21	2574.76	0.034315	6.58	46.84	49.98	1.20
WASH215	WASH215	819.42	100-Yr_Encroache	308.00	2572.82	2574.09	2574.21	2574.76	0.034260	6.57	46.87	49.98	1.20
WASH215	WASH215	661.36	100-Yr	308.00	2567.30	2568.31	2568.44	2568.92	0.039719	6.23	49.45	63.29	1.24
WASH215	WASH215	661.36	100-Yr_Encroache	308.00	2567.30	2568.31	2568.44	2568.92	0.039757	6.23	49.43	63.28	1.24
WASH215	WASH215	485.15	100-Yr	308.00	2561.69	2562.59	2562.68	2563.08	0.040321	5.61	54.91	78.79	1.18
WASH215	WASH215	485.15	100-Yr_Encroache	308.00	2561.69	2562.59	2562.68	2563.08	0.040798	5.63	54.70	78.74	1.19
WASH215	WASH215	357.34	100-Yr	308.00	2556.72	2557.98	2557.99	2558.38	0.033396	5.11	60.26	81.34	1.05
WASH215	WASH215	357.34	100-Yr_Encroache	308.00	2556.72	2557.98	2557.99	2558.38	0.033026	5.09	60.48	81.40	1.04
WASH215	WASH215	150.52	100-Yr	308.00	2549.92	2551.27	2551.27	2551.70	0.032599	5.26	58.60	70.29	1.01
WASH215	WASH215	150.52	100-Yr_Encroache	308.00	2549.92	2551.27	2551.27	2551.70	0.032599	5.26	58.60	70.29	1.01
WASH215	WASH215	22.86	100-Yr	308.00	2545.43	2547.13	2547.31	2547.96	0.026015	7.31	42.12	38.29	1.23
WASH215	WASH215	22.86	100-Yr_Encroache	308.00	2545.43	2547.13	2547.31	2547.96	0.026061	7.32	42.09	38.28	1.23

O SITE BOUNDARY CROSS SECTION

HY-8 Culvert Calculation Output

HY-8 Culvert Analysis Report

Culvert: ON-155

Crossing Discharge Data

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

Minimum Flow: 60 cfs

Design Flow: 153 cfs

Maximum Flow: 153 cfs

Table 1 - Summary of Culvert Flows at Crossing: ON 155

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2620.00	60.00	60.00	0.00	1
2620.17	69.30	69.30	0.00	1
2620.33	78.60	78.60	0.00	1
2620.49	87.90	87.90	0.00	1
2620.65	97.20	97.20	0.00	1
2620.80	106.50	106.50	0.00	1
2620.96	115.80	115.80	0.00	1
2621.12	125.10	125.10	0.00	1
2621.29	134.40	134.40	0.00	1
2621.47	143.70	143.70	0.00	1
2621.65	153.00	153.00	0.00	1
2622.00	169.17	169.17	0.00	Overtopping

Rating Curve Plot for Crossing: ON 155

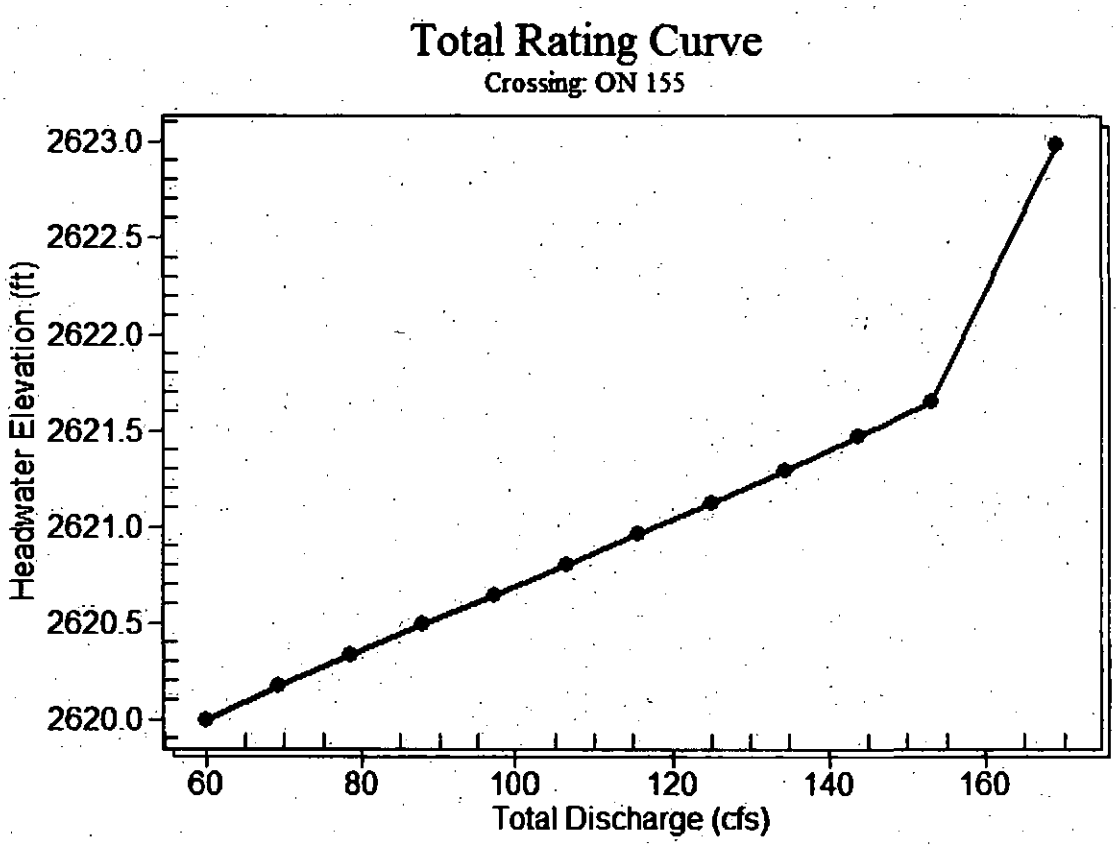


Table 2 - Culvert Summary Table: Culvert 1

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)
60.00	60.00	2620.00	1.998	0.615	1-S2n	0.846	1.436	0.971	1.000	10.059	0.000
69.30	69.30	2620.17	2.171	0.786	1-S2n	0.907	1.546	1.055	1.000	10.399	0.000
78.60	78.60	2620.33	2.334	0.956	1-S2n	0.969	1.648	1.137	1.000	10.694	0.000
87.90	87.90	2620.49	2.491	1.134	1-S2n	1.030	1.748	1.215	1.000	10.906	0.000
97.20	97.20	2620.65	2.646	1.316	1-S2n	1.092	1.844	1.289	1.000	11.154	0.000
106.50	106.50	2620.80	2.800	1.499	1-S2n	1.144	1.933	1.362	1.000	11.371	0.000
115.80	115.80	2620.96	2.958	1.686	1-S2n	1.196	2.017	1.432	1.000	11.587	0.000
125.10	125.10	2621.12	3.120	1.882	5-S2n	1.249	2.101	1.499	1.000	11.805	0.000
134.40	134.40	2621.29	3.289	2.079	5-S2n	1.301	2.178	1.567	1.000	11.994	0.000
143.70	143.70	2621.47	3.466	2.656	5-S2n	1.353	2.251	1.632	1.000	12.185	0.000
153.00	153.00	2621.65	3.652	2.828	5-S2n	1.402	2.320	1.696	1.000	12.384	0.000

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Straight Culvert

Inlet Elevation (invert): 2618.00 ft, Outlet Elevation (invert): 2617.00 ft

Culvert Length: 40.01 ft, Culvert Slope: 0.0250

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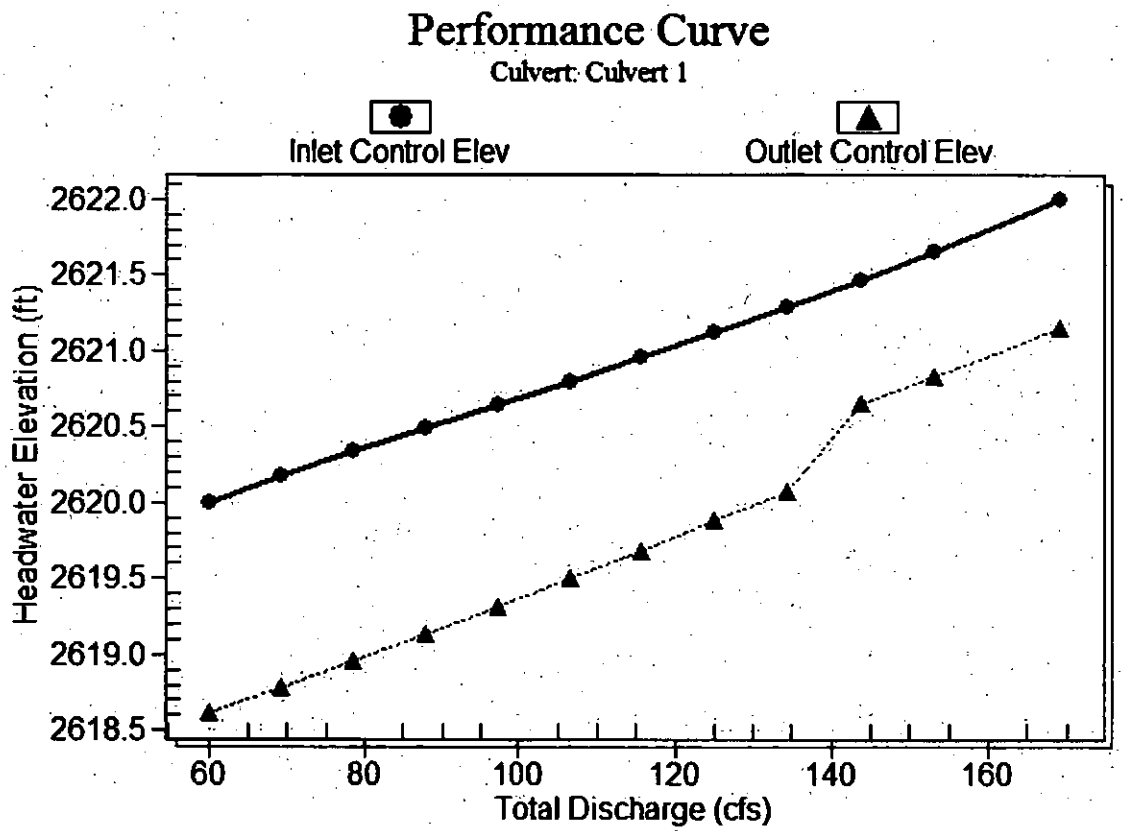
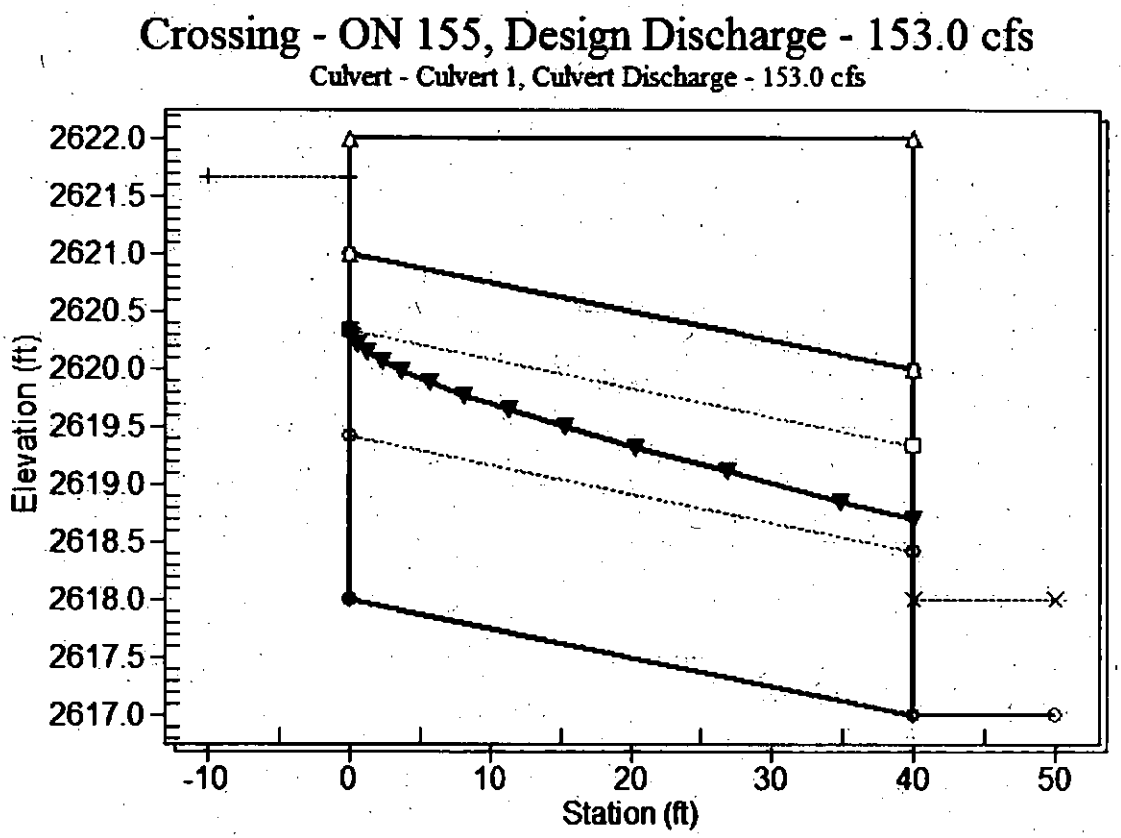
Culvert Performance Curve Plot: Culvert 1



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: 2618.00 ft

Outlet Station: 40.00 ft

Outlet Elevation: 2617.00 ft

Number of Barrels: 3

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: Grooved End in Headwall

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: ON 155)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
60.00	2618.00	1.00
69.30	2618.00	1.00
78.60	2618.00	1.00
87.90	2618.00	1.00
97.20	2618.00	1.00
106.50	2618.00	1.00
115.80	2618.00	1.00
125.10	2618.00	1.00
134.40	2618.00	1.00
143.70	2618.00	1.00
153.00	2618.00	1.00

Tailwater Channel Data - ON 155

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2618.00 ft

Roadway Data for Crossing: ON 155

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 90.00 ft

Crest Elevation: 2622.00 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Culvert: ON-160

Crossing Discharge Data

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

Minimum Flow: 0 cfs

Design Flow: 23 cfs

Maximum Flow: 63 cfs

Table 4 - Summary of Culvert Flows at Crossing: ON160

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2607.00	0.00	0.00	0.00	1
2608.48	6.30	6.30	0.00	1
2609.97	12.60	12.60	0.00	1
2612.57	18.90	18.90	0.00	1
2613.05	23.00	19.81	3.02	20
2613.12	31.50	19.93	11.46	5
2613.15	37.80	20.00	17.71	4
2613.19	44.10	20.06	23.81	3
2613.22	50.40	20.12	30.13	3
2613.25	56.70	20.17	36.45	3
2613.27	63.00	20.22	42.74	3
2613.00	19.72	19.72	0.00	Overtopping

Rating Curve Plot for Crossing: ON160

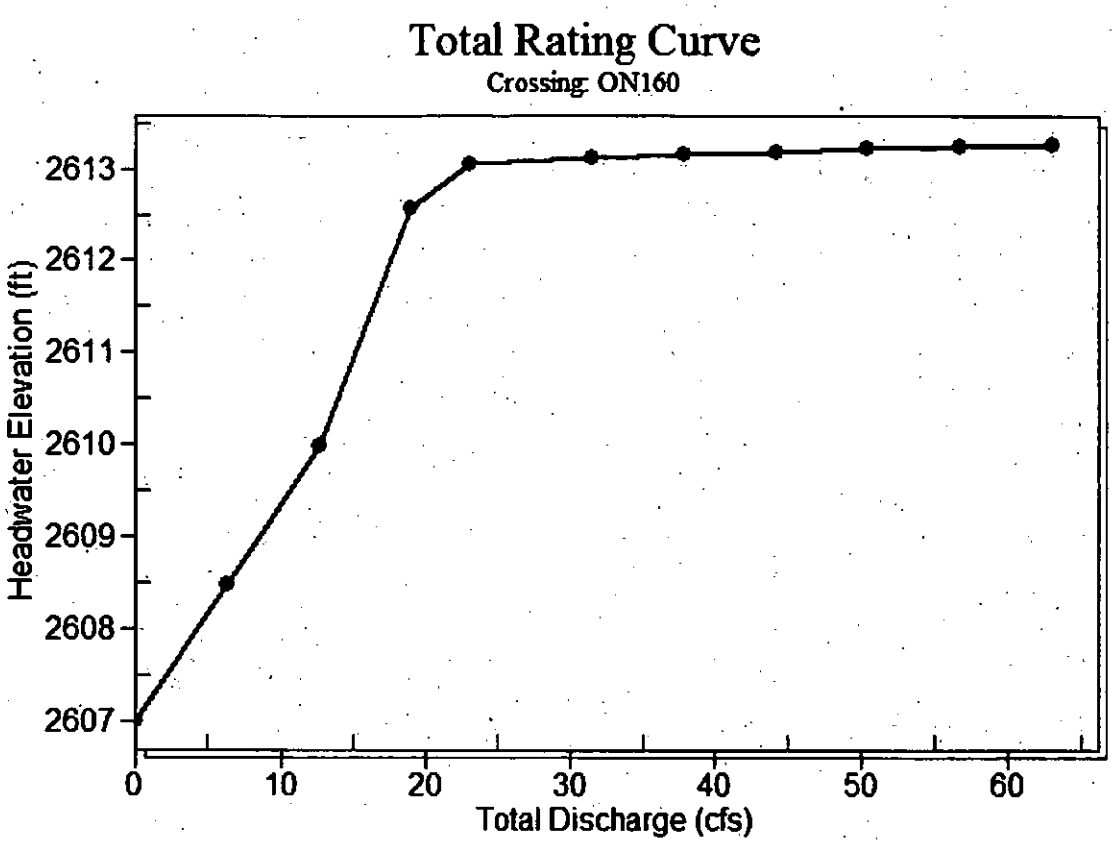


Table 5 - Culvert Summary Table: Culvert 1

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)
0.00	0.00	2607.00	0.000	0.000	0-NF	0.000	0.000	1.000	1.000	0.000	0.000
6.30	6.30	2608.48	1.479	0.0*	1-S2n	0.505	0.965	0.554	1.000	10.623	0.000
12.60	12.60	2609.97	2.974	1.091	5-S2n	0.744	1.337	0.837	1.000	12.433	0.000
18.90	18.90	2612.57	5.574	3.239	5-S2n	0.962	1.453	1.085	1.000	13.814	0.000
23.00	19.81	2613.05	6.047	3.632	5-S2n	0.995	1.500	1.168	1.000	13.463	0.000
31.50	19.93	2613.12	6.115	3.685	5-S2n	1.000	1.500	1.171	1.000	13.497	0.000
37.80	20.00	2613.15	6.153	3.715	5-S2n	1.002	1.500	1.173	1.000	13.516	0.000
44.10	20.06	2613.19	6.186	3.740	5-S2n	1.005	1.500	1.126	1.000	14.076	0.000
50.40	20.12	2613.22	6.217	3.765	5-S2n	1.007	1.500	1.155	1.000	13.809	0.000
56.70	20.17	2613.25	6.247	3.787	5-S2n	1.009	1.500	1.198	1.000	13.347	0.000
63.00	20.22	2613.27	6.274	3.809	5-S2n	1.010	1.500	1.010	1.000	15.993	0.000

* Full Flow Headwater elevation is below inlet invert.

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Straight Culvert

Inlet Elevation (invert): 2607.00 ft, Outlet Elevation (invert): 2605.00 ft

Culvert Length: 40.05 ft, Culvert Slope: 0.0500

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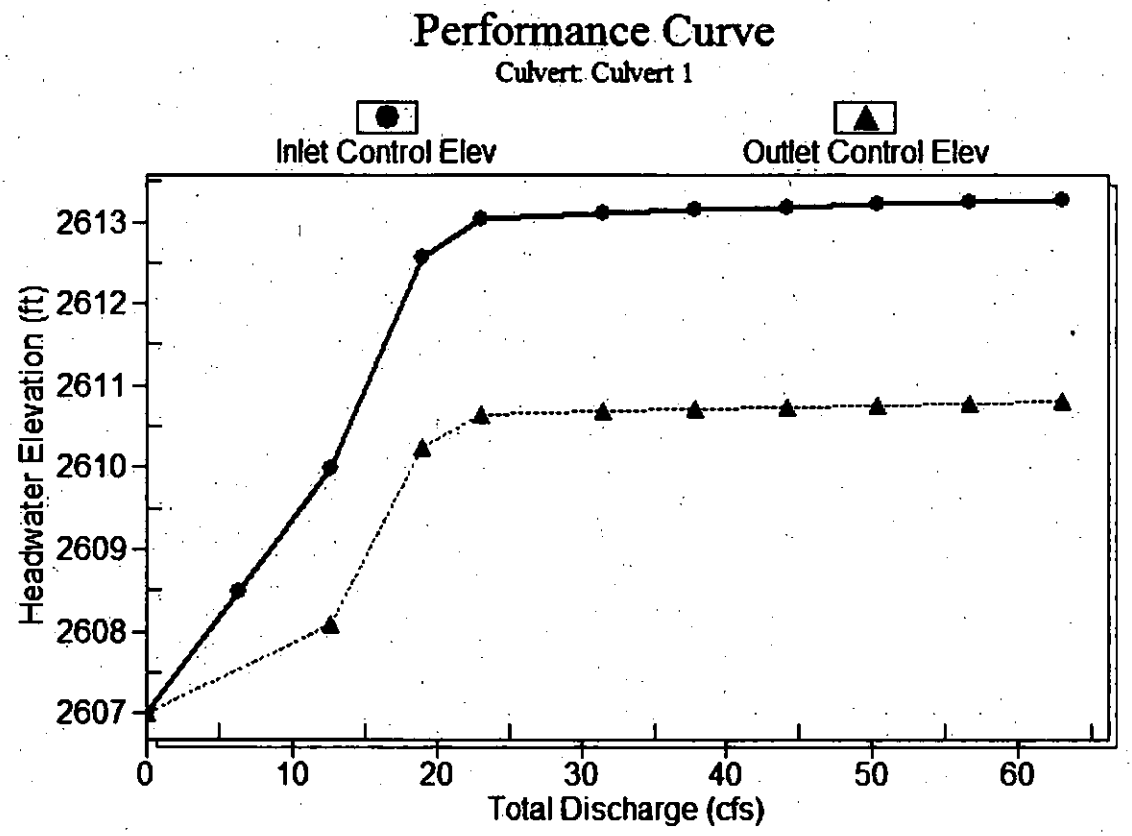
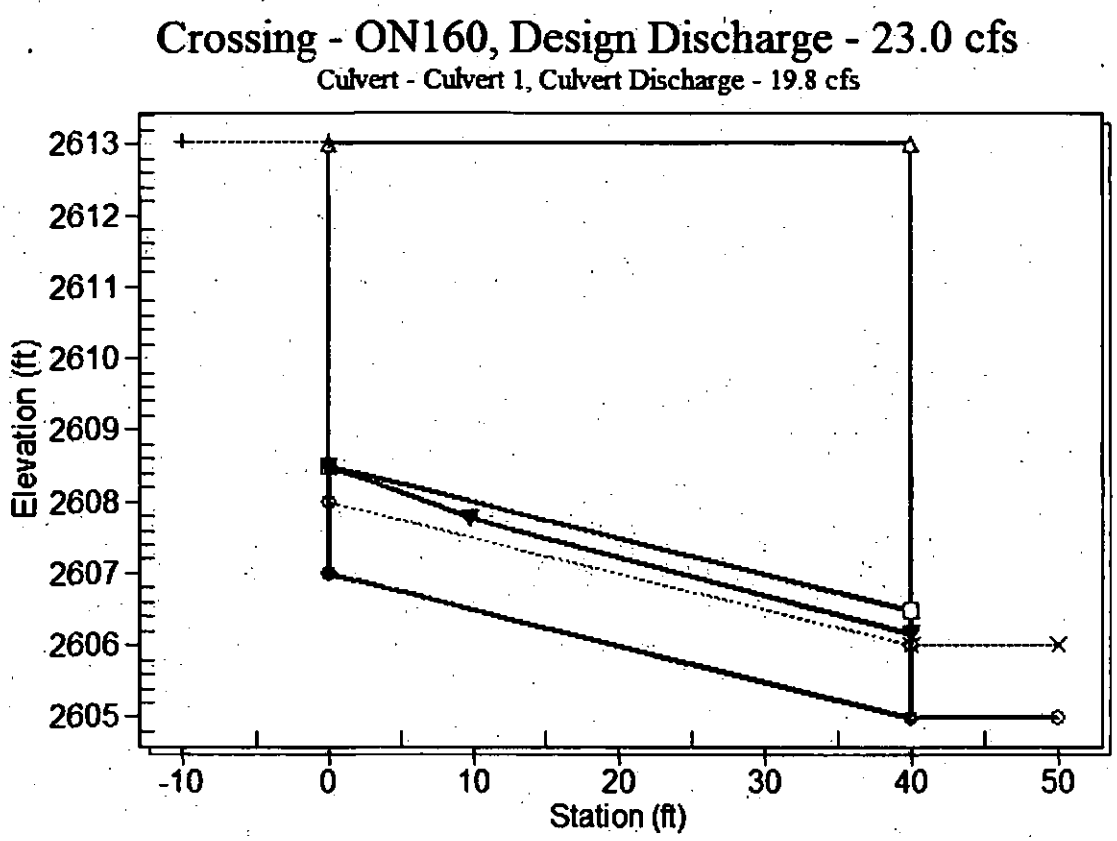
Culvert Performance Curve Plot: Culvert 1



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: 2607.00 ft

Outlet Station: 40.00 ft

Outlet Elevation: 2605.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 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 6 - Downstream Channel Rating Curve (Crossing: ON160)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	2606.00	1.00
6.30	2606.00	1.00
12.60	2606.00	1.00
18.90	2606.00	1.00
23.00	2606.00	1.00
31.50	2606.00	1.00
37.80	2606.00	1.00
44.10	2606.00	1.00
50.40	2606.00	1.00
56.70	2606.00	1.00
63.00	2606.00	1.00

Tailwater Channel Data - ON160

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2606.00 ft

Roadway Data for Crossing: ON160

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 2613.00 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Culvert: ON-182

Crossing Discharge Data

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

Minimum Flow: 0 cfs

Design Flow: 18 cfs

Maximum Flow: 39 cfs

Table 7 - Summary of Culvert Flows at Crossing: ON182

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2593.00	0.00	0.00	0.00	1
2594.06	3.90	3.90	0.00	1
2594.73	7.80	7.80	0.00	1
2595.68	11.70	11.70	0.00	1
2597.00	15.60	15.49	0.00	75
2597.06	18.00	15.63	2.30	7
2597.12	23.40	15.80	7.55	5
2597.16	27.30	15.89	11.36	4
2597.19	31.20	15.97	15.10	3
2597.22	35.10	16.05	18.97	3
2597.25	39.00	16.12	22.84	3
2597.00	15.49	15.49	0.00	Overtopping

Rating Curve Plot for Crossing: ON182

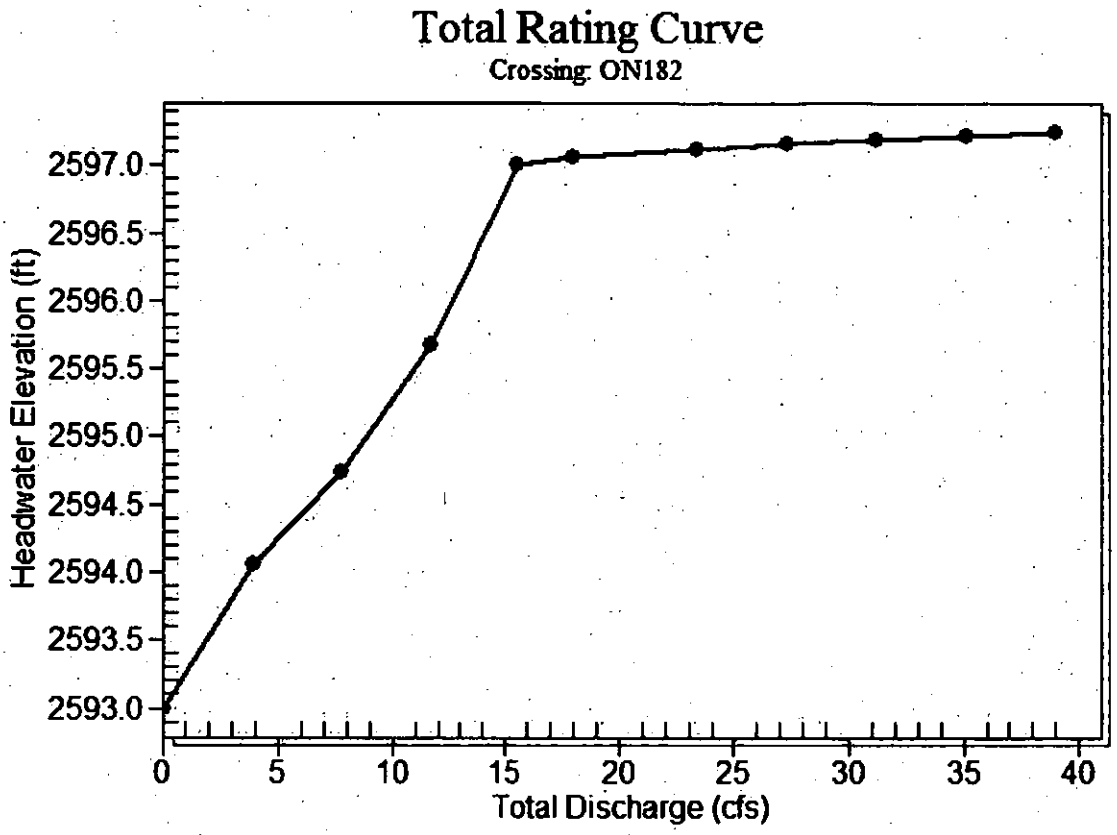


Table 8 - Culvert Summary Table: Culvert 1

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	2593.00	0.000	0.000	0-NF	0.000	0.000	1.000	1.000	0.000	0.000
3.90	3.90	2594.06	1.060	0.0*	1-S2n	0.352	0.755	0.375	1.000	11.209	0.000
7.80	7.80	2594.73	1.731	0.0*	5-S2n	0.508	1.078	0.565	1.000	12.835	0.000
11.70	11.70	2595.68	2.677	0.0*	5-S2n	0.634	1.301	0.720	1.000	13.970	0.000
15.60	15.49	2597.00	3.999	0.985	5-S2n	0.746	1.412	0.857	1.000	14.845	0.000
18.00	15.63	2597.06	4.056	1.032	5-S2n	0.750	1.414	0.861	1.000	14.892	0.000
23.40	15.80	2597.12	4.122	1.092	5-S2n	0.754	1.425	0.868	1.000	14.905	0.000
27.30	15.89	2597.16	4.159	1.120	5-S2n	0.757	1.419	0.869	1.000	14.984	0.000
31.20	15.97	2597.19	4.193	1.148	5-S2n	0.759	1.420	0.872	1.000	14.997	0.000
35.10	16.05	2597.22	4.225	1.179	5-S2n	0.761	1.429	0.875	1.000	14.997	0.000
39.00	16.12	2597.25	4.254	1.199	5-S2n	0.763	1.423	0.878	1.000	15.018	0.000

* Full Flow Headwater elevation is below inlet invert.

****

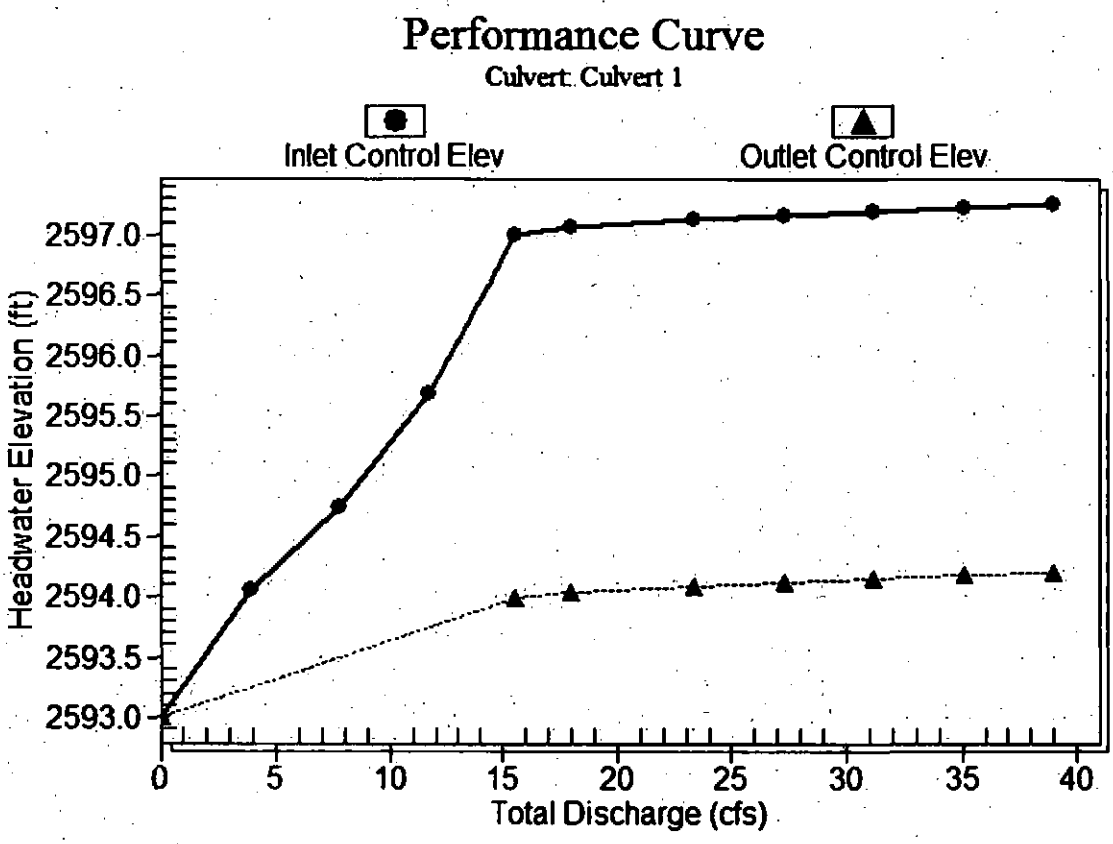
Straight Culvert

Inlet Elevation (invert): 2593.00 ft, Outlet Elevation (invert): 2590.00 ft

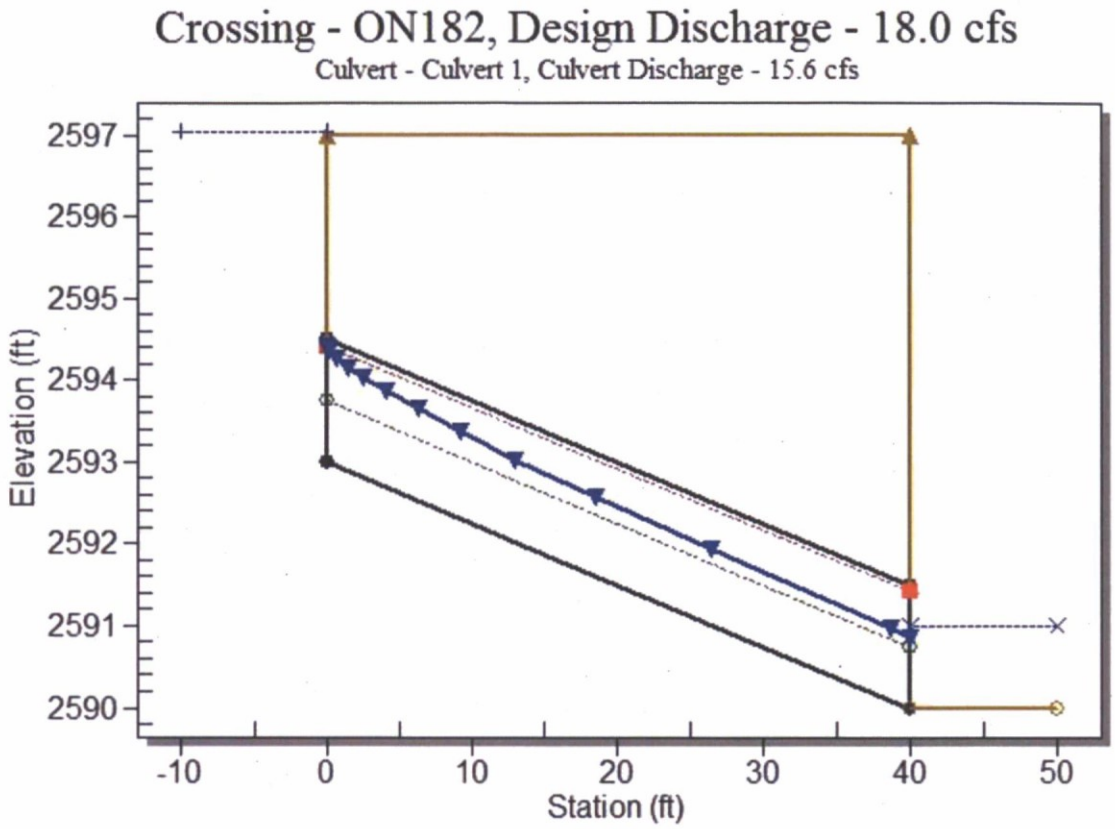
Culvert Length: 40.11 ft, Culvert Slope: 0.0750

****

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: 2593.00 ft

Outlet Station: 40.00 ft

Outlet Elevation: 2590.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 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 9 - Downstream Channel Rating Curve (Crossing: ON182)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	2591.00	1.00
3.90	2591.00	1.00
7.80	2591.00	1.00
11.70	2591.00	1.00
15.60	2591.00	1.00
18.00	2591.00	1.00
23.40	2591.00	1.00
27.30	2591.00	1.00
31.20	2591.00	1.00
35.10	2591.00	1.00
39.00	2591.00	1.00

Tailwater Channel Data - ON182

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2591.00 ft

Roadway Data for Crossing: ON182

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

Crest Elevation: 2597.00 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft

Culvert: ON-183

Crossing Discharge Data

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

Minimum Flow: 0 cfs

Design Flow: 18 cfs

Maximum Flow: 39 cfs

Table 10 - Summary of Culvert Flows at Crossing: ON183

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2556.00	0.00	0.00	0.00	1
2557.10	3.90	3.90	0.00	1
2557.77	7.80	7.80	0.00	1
2558.07	11.70	9.19	2.45	12
2558.12	15.60	9.42	6.12	5
2558.15	18.00	9.54	8.41	4
2558.20	23.40	9.77	13.58	4
2558.24	27.30	9.92	17.29	3
2558.27	31.20	10.05	21.09	3
2558.30	35.10	10.18	24.89	3
2558.33	39.00	10.29	28.69	3
2558.00	8.89	8.89	0.00	Overtopping

Rating Curve Plot for Crossing: ON183

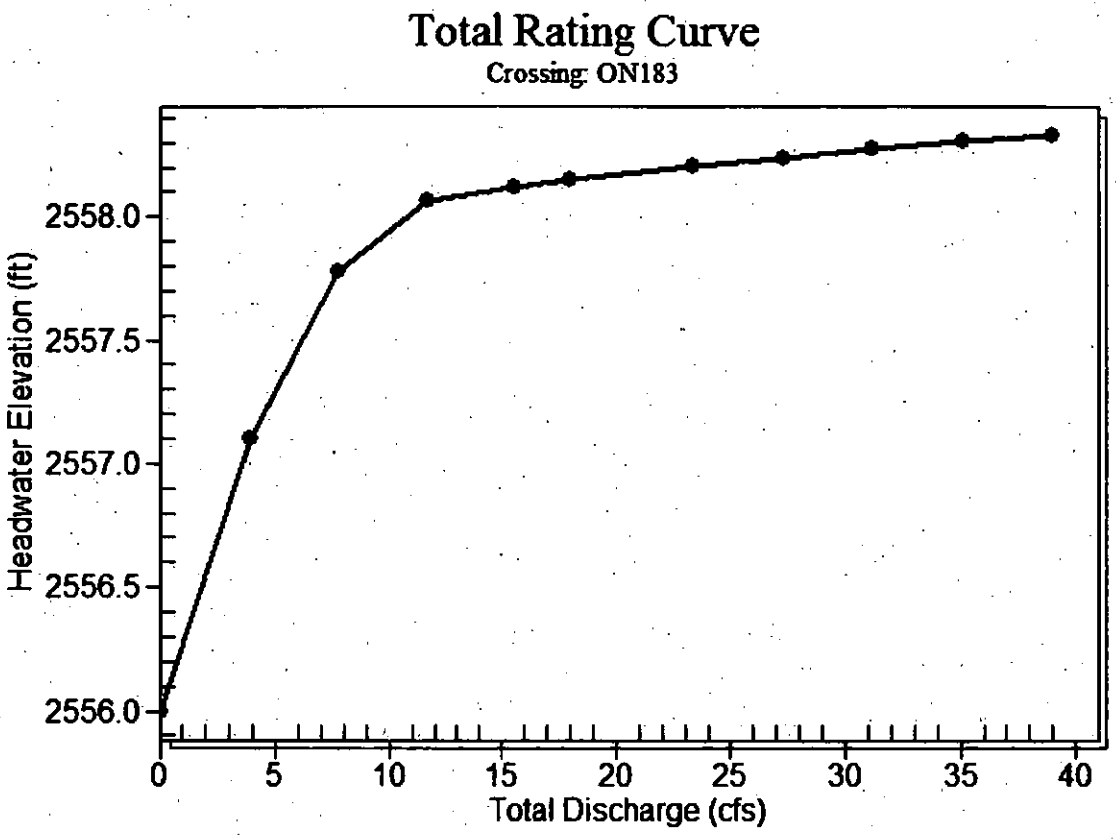


Table 11 - Culvert Summary Table: Culvert 1

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	2556.00	0.000	0.000	0-NF	0.000	0.000	1.000	1.000	0.000	0.000
3.90	3.90	2557.10	1.104	0.184	1-S2n	0.525	0.755	0.536	1.000	6.874	0.000
7.80	7.80	2557.77	1.775	0.812	5-S2n	0.776	1.078	0.799	1.000	8.146	0.000
11.70	9.19	2558.07	2.065	1.352	5-S2n	0.859	1.167	0.885	1.000	8.470	0.000
15.60	9.42	2558.12	2.120	1.414	5-S2n	0.873	1.185	0.900	1.000	8.519	0.000
18.00	9.54	2558.15	2.148	1.445	5-S2n	0.880	1.192	0.907	1.000	8.544	0.000
23.40	9.77	2558.20	2.203	1.505	5-S2n	0.894	1.205	0.921	1.000	8.590	0.000
27.30	9.92	2558.24	2.238	1.544	5-S2n	0.902	1.213	0.930	1.000	8.618	0.000
31.20	10.05	2558.27	2.271	1.580	5-S2n	0.910	1.221	0.939	1.000	8.643	0.000
35.10	10.18	2558.30	2.302	1.613	5-S2n	0.918	1.227	0.946	1.000	8.665	0.000
39.00	10.29	2558.33	2.332	1.645	5-S2n	0.924	1.234	0.954	1.000	8.685	0.000

****

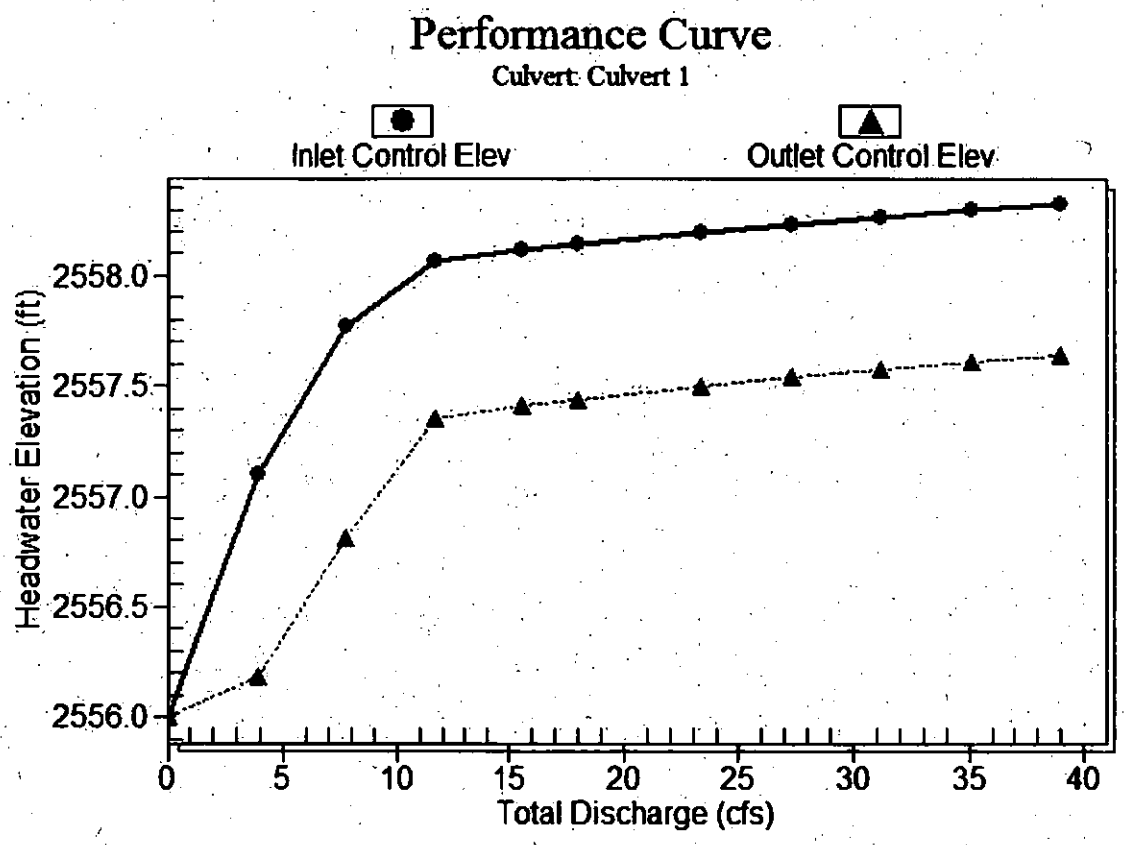
Straight Culvert

Inlet Elevation (invert): 2556.00 ft, Outlet Elevation (invert): 2555.00 ft

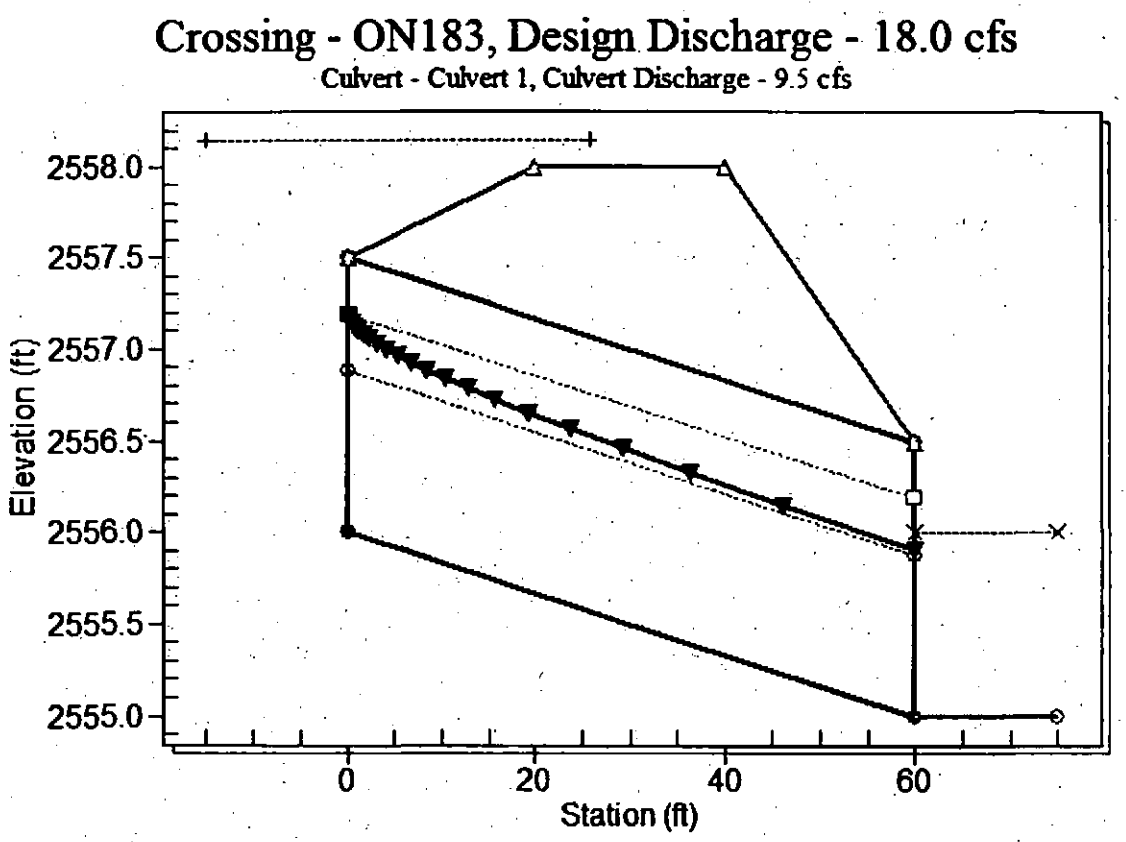
Culvert Length: 60.01 ft, Culvert Slope: 0.0167

****

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: 2556.00 ft

Outlet Station: 60.00 ft

Outlet Elevation: 2555.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 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: ON183)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	2556.00	1.00
3.90	2556.00	1.00
7.80	2556.00	1.00
11.70	2556.00	1.00
15.60	2556.00	1.00
18.00	2556.00	1.00
23.40	2556.00	1.00
27.30	2556.00	1.00
31.20	2556.00	1.00
35.10	2556.00	1.00
39.00	2556.00	1.00

Tailwater Channel Data - ON183

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2556.00 ft

Roadway Data for Crossing: ON183

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 50.00 ft

Crest Elevation: 2558.00 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 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:

$V = \Delta CRA$; 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
7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone: 480-312-2500 • Fax: 480-312-7781

Appendix E – Preliminary Grading Plan