CONCEPTUAL DRAINAGE & WATER QUALITY SUMMARY FOR SOUTHWEST VILLAGE SPECIFIC PLAN

Job Number 15013-C

March 29, 2019
Revised: October 25, 2019
Revised: July 16, 2020
Revised: July 15, 2022
Revised: December 15, 2022
Revised: April 28, 2023

RICK
ENGINEERING COMPANY

CONCEPTUAL DRAINAGE & WATER QUALITY SUMMARY

FOR

SOUTHWEST VILLAGE SPECIFIC PLAN

Job Number 15013-C

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SOUTHWEST VILLAGE SPECIFIC PLAN

REVISION PAGE
April 28, 2023

The following comments have been provided by the City of San Diego on March 3, 2023, and updates have been made to the three reports associated with these comments all dated December 15th, 2022. The three reports include, the "Conceptual Drainage and Water Quality Summary for Southwest Village Specific Plan", the "Drainage Study for Southwest Village Vesting Tentative Map (VTM)", and the "Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Southwest Village Vesting Tentative Map (VTM)", all dated April 28, 2023. A meeting was held on November 10th, 2022, with the City of San Diego to review the comments previously provided and to develop concurrence on what should be addressed with the Vesting Tentative Map (VTM) submittal and what can be addressed with final engineering. Many of the comments received on March 3, 2023, are repeat comments that were previously discussed with the City and an approach agreed to. Below are the comments provided by the City of San Diego that are related to the Specific Plan with responses from Rick Engineering Company in bold.

Specific Plan / VTM Drainage Study / VTM PDP SWQMP

95. Prior to the issuance of any building permit, the owner/Permittee shall incorporate any construction Best Management Practices necessary to comply with Chapter 14, Article 2, Division 1 (Grading Regulations) of the Municipal Code, into the construction plans or specifications. (From Cycle 15)

Best Management Practices (BMPs) have been identified throughout the site to treat the proposed development. The BMPs for the VTM areas (Basin 100, 200, 300, and 1400) are shown on the civil plan sheets and approximate locations for the Specific Plan areas are also identified in the Conceptual Water Quality and HMP Exhibit that is apart of Map Pocket 3 of this report.

96. Prior to the issuance of any building permit, the Owner/Permittee shall submit a Technical Report that will be subject to final review and approval by the city engineer, based on the Storm Water Standards in effect at the time of the construction permit issuance. (From Cycle 15)

Comment noted. As the Specific Plan areas move towards preliminary engineering, technical reports will be developed for review and approval by the City Engineering staff that will comply with the Storm Water Standard in effect at that time.

97. Prior to the issuance of any building permit, the Owner/Permittee must enter into a Storm Water Management and Discharge Control Maintenance Agreement, which will be recorded in the property records of the county, satisfactory to the City Engineer. (From Cycle 15)

A draft Storm Water Management and Discharge Control Maintenance Agreement (SWMDCMA) has been included in attachment 3 of the PDPSWQMP document and will be recorded during the Final Engineering phase of this project.

98. Prior to the issuance of any building permit, the Owner/Permittee shall enter into a Maintenance Agreement for the ongoing permanent BMP maintenance, satisfactory to the City Engineer. (From Cycle 15)

A draft Maintenance Agreements has been included in attachment 3 of the PDPSWQMP document and will be recorded during the Final Engineering phase of this project.

102. The drainage system proposed for this development, as shown on the site plan, is subject to approval by the City Engineer. (From Cycle 15)

The project engineers have met with City staff extensively on this project and most recently on November 10th, 2022 to discuss the drainage system for this project and explain the complexities that are introduced with the landslide area directly to the west of Basin 300.

104. Development of this project shall comply with all storm water construction requirements of the State Construction General Permit, Order No. 2009-0009-DWQ, or subsequent order, and the Municipal Storm Water Permit, Order No. R9-2013-0001, or subsequent order. In accordance with Order No. 2009-0009DWQ, or subsequent order, a Risk Level Determination shall be calculated for the site and a Storm Water Pollution Prevention Plan (SWPPP) shall be implemented concurrently with the commencement of grading activities. (From Cycle 15)

The project will be in compliance with the State Construction General Permit, Order No. 2009-0009-DWQ, or subsequent order, and the Municipal Storm Water Permit, Order No. R9-2013-0001, or subsequent order including a SWPPP and a Risk Level Determination, which will be completed during the Final Engineering phase of this project.

105. Prior to issuance of a grading or a construction permit, a copy of the Notice of Intent (NOI) with a valid Waste Discharge ID number (WDID#) shall be submitted to the City of San Diego as a proof of enrollment under the Construction General Permit. When ownership of the entire site or portions of the site changes prior to filing of the Notice of Termination (NOT), a revised NOI shall be submitted electronically to the State Water Resources Board in accordance with the provisions as set forth in Section II.C of Order No. 2009-0009-DWQ and a copy shall be submitted to the City. (From Cycle 15)

The project will prepare and NOI with a valid WDID number as proof of enrollment under the CGP and will be prepared during the Final Engineering phase of the project.

106. The Subdivider shall enter into an agreement to indemnify, protect, and hold harmless the City, its officials and employees from any and all claims, demands, causes or action, liability or loss because of, or arising out of surface drainage entering into the property from the Right-of-Way due to the current drainage/ storm water design. (From Cycle 15)

In the locations where public storm drain systems cross into private lots, EMRAs will be provided so that the City will be able to maintain the public system. A hold harmless agreement can also be prepared and entered into with the City of San Diego.

139. The Subdivider shall demonstrate that mitigated peak flow rates for the 5, 10, 25, 50 and 100-year design storms do not exceed pre-project runoff rates at each outfall location. The pre-project runoff rate limit at each storm drain outfall should coincide with existing conditions, before any development has commenced in the Specific Plan, and not a future phased condition. (New Issue)

This has been previously addressed with the City of San Diego. The City of San Diego will be responsible for reviewing hydrologic and hydraulic studies and design features for conformance to criteria given in the "Drainage Design Manual" for every map or permit for which discretionary approval is sought from the City of San Diego. These project specific studies for each development will need to address potential impacts to downstream storm drainage facilities with sufficient detail to support the discretionary action. In addition, the new development projects will need to be able to demonstrate that the 50-year and 100-year detention requirements have been addressed (in order to satisfy the design criteria of the CPU Drainage Study). Additionally, the drainage area flowing into Mexico at the Spring Canyon concentration point and will need to comply with the US/Mexico International flood control detention requirements (i.e. – 5, 10, 25, 50, & 100-year storm events).

140. The Subdivider shall fully document all diversions of drainage area between the main watershed areas of the site. (New Issue)

This has been previously coordinated with the City of San Diego and in both the Drainage Study as well as the PDPSWQMP diversion maps are provided showing the area that is being diverted to Moody Canyon and Spring Canyon. It should also be noted that detention and hydromodification management are provided at each POC.

141. The Subdivider shall utilize Conjunctive Use guidelines for detention basin modeling of all mixed-use detention basins. (New Issue)

The guidelines for conjunctive use have been used when preparing the detention modeling for the VTM areas. Please see Appendix F of the Drainage Study.

142. The Subdivider shall demonstrate all proposed drainage basins have access and fencing provided to meet City criteria. (New Issue)

The proposed BMPs for the VTM area as shown in the PDPSWQMP are a combination of underground storage and compact biofiltration. Basin 1400 has an above ground biofiltration basin at the end of Beyer Road. This basin has an access road as shown on the plan sheets. Fencing guidelines have been followed per the City of San Diego City criteria.

143. The Subdivider shall provide a hydraulic analysis downstream at each storm drain outfall in the Spring, Moody, and Dillon Creek watersheds demonstrating proposed condition floodplain limits and channel velocities. (New Issue)

This has been previously coordinated with the City on the November 10th, 2022 meeting. Approximate floodplain limits have been provided for Moody Canyon, and the backup has been provided in the report titled, "Drainage Study for Southwest Village Vesting Tentative Map (VTM)" dated April 28, 2023. Please refer to Appendix I for additional information and to the exhibit in Map Pocket 2 for the mark up of the approximate floodplain limits. Once the areas tributary to Dillion Canyon are developed additional analysis can be done. If Spring Canyon were to be considered, a watershed wide approach would be necessary to accurately map the floodplain, including in-depth hydraulic analysis of the culvert that crosses from the US into Mexico.

144. The Subdivider shall provide a hydraulic analysis downstream at each storm drain outfall involving a diversion of drainage area or an increase in any of the analyzed peak flows as compared to pre-project conditions. (New Issue)

All project areas, including those where diversion occurs, is subject to both detention and hydromodification requirements. The new development projects will need to be able to demonstrate that the 50-year and 100-year detention requirements have been addressed (in order to satisfy the design criteria of the CPU Drainage Study). Additionally, the drainage area flowing into Mexico at the Spring Canyon concentration point and will need to comply with the US/Mexico International flood control detention requirements (i.e. – 5, 10, 25, 50, & 100-year storm events). With these requirements in place the post-project peak flows are anticipated to be less than or equal to the pre-project flows.

145. The Subdivider shall provide detailed energy dissipation analysis at each storm drain outfall to ensure proper receiving water protection from discharges of the 100-year design storm. (New Issue)

This comment has been previously coordinated with the City of San Diego. Outfalls from the VTM area Basin 100 and Basin 200 will be directed through an SDD-105 and Basin 300 will be directed down Beyer Road to a biofiltration basin located adjacent to Beyer Park. Additional analysis for other project areas will be considered as those pads are developed in the Specific Plan area and additional analysis will be performed in final engineering for each of the VTM outfalls.

CONCEPTUAL DRAINAGE & WATER QUALITY SUMMARY
FOR
SOUTHWEST VILLAGE SPECIFIC PLAN

REVISION PAGE
December 15, 2022

This Conceptual Drainage and Water Quality Summary presents a revision to the report titled, "Conceptual Drainage & Water Quality Summary for Southwest Village Specific Plan," dated July 15th, 2022. The following comments have been provided by the City of San Diego on October 10th, 2022, and updates have been made to the three reports associated with these comments. The three reports include, the "Conceptual Drainage and Water Quality Summary for Southwest Village Specific Plan", the "Drainage Study for Southwest Village Vesting Tentative Map (VTM)", and the "Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Southwest Village Vesting Tentative Map (VTM)", all dated December 15, 2022. A meeting was held on November 9th, 2022, with the City of San Diego to review the comments provided and to develop concurrence on what should be addressed with the Vesting Tentative Map (VTM) submittal and what can be addressed with final engineering. The comments provided by the City of San Diego that are related to the Specific Plan are below with responses from Rick Engineering Company in bold.

Specific Plan / VTM Drainage Study / VTM PDP SWQMP

120. The following are comments from the Deputy City Engineer on the 3 drainage/storm water reports: (New Issue)

Comment noted. The report that the follow comments relate to are for the Specific Plan, the VTM Drainage Study, and the VTM PDPSWQMP.

121. For each proposed storm drain outfall location, provide the pre-project drainage area and 100-year peak runoff rates along with the post-project drainage area and 100-year unmitigated and mitigated peak runoff rates. The table should include a column to reflect diversion of drainage areas and peak flow changes. (New Issue)

The Specific Plan document includes a summary of the 100-year peak runoff rates along with drainage area for the pre and the post project condition. Please refer to Map Pocket 2 of the report titled, "Conceptual Drainage and Water Quality Summary for Southwest Village Specific Plan" dated December 15, 2022. The VTM specific Drainage Study includes both the unmitigated and the mitigated flow rates please refer to Table 2.1 and Table 4.1 as well as the exhibits in Map Pocket 2. For the specific plan, final calculations for the mitigated peak will be performed as each area is developed.

122. For each of the main receiving waters (Dillon Canyon, Spring Canyon, Moody Canyon, and site drainages toward Beyer/San Ysidro Blvd), provide the pre-project drainage area and 100-year peak runoff rates along with the post-project drainage area and 100-year

unmitigated and mitigated peak runoff rates. The table should include a column to reflect diversion of drainage areas and peak flow changes as a result of the proposed Specific Plan development. (New Issue)

An overall exhibit has been provided in the Specific Plan report that summarizes pre and post project drainage to the main receiving waters. Please refer to Map Pocket 2 in the report titled, "Conceptual Drainage and Water Quality Summary for Southwest Village Specific Plan" dated December 15, 2022.

123. Detail how the Specific Plan will implement peak flow attenuation routing and adhere to the regional Conjunctive Use Guidelines for mixed use drainage facilities. (New Issue)

For the Specific Plan, peak flow attenuation routing will be developed at a later date when the each of the subsequent areas are considered. The regional conjunctive use guidelines will be followed based on the most recent City of San Diego Stormwater Standards manual (currently dated May 2021).

124. For each proposed basin, provide the concept for providing basin access and fencing. (New Issue)

Project specific details have been prepared for permanent storm water BMPs for the VTM reports, including maintenance access and fencing if required. Approximate locations have been identified for Specific Plan level BMPs and additional information will be provided as each of the lots are developed.

125. Detention routing for multiple storm events (100-year plus lower intensity runoff events) will be required. (New Issue)

The City of San Diego will be responsible for reviewing hydrologic and hydraulic studies and design features for conformance to criteria given in the "Drainage Design Manual" for every map or permit for which discretionary approval is sought from the City of San Diego. These project specific studies for each development will need to address potential impacts to downstream storm drainage facilities with sufficient detail to support the discretionary action. In addition, the new development projects will need to be able to demonstrate that the 50-year and 100-year detention requirements have been addressed (in order to satisfy the design criteria of the CPU Drainage Study). Additionally, the drainage area flowing into Mexico at the Spring Canyon concentration point and will need to comply with the US/Mexico International flood control detention requirements (i.e. – 5, 10, 25, 50, & 100-year storm events).

126. Provide approximate floodplain limits and channel velocities in Dillon Canyon, Spring Canyon, and Moody Canyon downstream of the project outfalls based on the total post-project runoff rates (onsite plus offsite runoff). (New Issue)

Approximate floodplain limits have been provided for Moody Canyon, and the back up has been provided in the report titled, "Drainage Study for Southwest Village Vesting Tentative Map (VTM)" dated December 15, 2022. Please refer to Appendix I for additional information and to the exhibit in Map Pocket 2 for the mark up of the approximate floodplain limits. Once the areas tributary to Dillion Canyon are developed additional analysis can be done. If Spring Canyon were to be considered, a watershed wide approach would be necessary to accurately map the floodplain, including in-depth hydraulic analysis of the culvert that crosses from the US into Mexico.

127. Provide the culvert capacity at the international border (Spring Canyon) and Enright Drive (Moody Canyon) and compare the capacity to the post-project flows (onsite plus offsite runoff). Include inlet control calculations when determining culvert capacities. (New Issue)

Capacity of the storm drain within Enright Drive has been determined and has been included in Appendix E of the report titled, "Drainage Study for Southwest Village Vesting Tentative Map (VTM)" dated December 15, 2022. The capacity of the culvert at the international border (Spring Canyon) has not been provided per the 11/9/2022 meeting.

128. Describe the approach for sizing energy dissipation facilities at each storm drain outfall for 100-year flows and velocities from the proposed Specific Plan area. (New Issue)

Outfalls from the VTM area Basin 100 and Basin 200 will be directed through an SDD-105 and Basin 300 will be directed down Beyer Road to a biofiltration basin located adjacent to Beyer Park. Additional analysis for other project areas will be considered as those pads are developed in the Specific Plan area and additional analysis will be performed in final engineering for each of the VTM outfalls.

129. Comment on any channel protection measures needed downstream of the storm drain outfalls (in smaller canyons between the storm drain outfall and the main canyons, in the receiving waters, etc.) (New Issue)

Flowrates from the project site will be mitigated in the proposed project condition and no adverse impacts to the downstream receive channel are anticipated.

130. Provide specific information on the proposed BMP treatment facilities for pollution control. Information to include BMP name, BMP type, contributing drainage area, and contributing impervious area. For larger facilities, comment on pre-treatment options and design criteria for 100-year overflow structures and energy dissipation for basin inflows. (New Issue)

Please refer to the report titled, "Conceptual Drainage and Water Quality Summary for Southwest Village Specific Plan" and the "Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Southwest Village Vesting Tentative Map (VTM)" for additional information on the BMP names and types. In the Specific Plan report, Table 3-1, the narrative in Section 4, and Map Pocket 3 show this

information. In the PDP SWQMP, Attachment 1A and 1E provide BMP names and types as well as provide details for the pre-treatment units that will be used upstream of the underground storage units and upstream of the biofiltration basin.

131. Provide a summary of the Specific Plan area's infiltration condition. (New Issue)

Please refer to the report titled, "Geotechnical Feasibility Study – South Otay Mesa Property San Diego, California" dated October 4th, 2002, and prepared by GeoCon which is located in Attachment 6 of the PDPSWQMP.

132. Provide specific information on the proposed HMP flow control facilities. Information to include HMP facility name, HMP control type (basin, vault, etc.), contributing drainage area, and contributing impervious area. For larger facilities, comment on pre-treatment options and design criteria for 100-year overflow structures and energy dissipation for basin inflows. Comment on the sizing strategy for low-flow control orifices. (New Issue)

Please refer to the report titled, "Conceptual Drainage and Water Quality Summary for Southwest Village Specific Plan" and the "Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Southwest Village Vesting Tentative Map (VTM)" for additional information on the BMP names and types. In the Specific Plan report, the narrative in Section 4 and Map Pocket 3 shows this information. In the PDP SWQMP, Attachment 2A and 2D provide BMP names and types as well as provide details hydromodification.

133. Describe how the proposed design would provide mitigation for the Critical Coarse Sediment Yield Area present in the Specific Plan area. (New Issue)

The potential critical coarse sediment yield areas (PCCYAs) exhibit is provided in Attachment 2B of the PDPSWQMP. This shows some minor areas identified along the edge of the Specific Plan area. This is consistent with the project site which is situated at the top of a mesa top and is mostly flat. PCCYAs show up in areas that have a slope of greater than 10%. As discussed in the November 9th, 2022, meeting, additional analysis can be performed in final engineering (i.e. no net impact analysis) to show compliance with the City of San Diego Storm Water Standards.

134. It appears that the applicant is proposing use of a higher low-flow threshold of 0.5Q2 than typical. Since the receiving channel areas initially appear to the susceptible to a higher level of erosion, a more detailed review of the low-flow threshold report will be required. (New Issue)

The project is proposing to use 0.1Q2 for the outfalls from Basin 100 and Basin 200 in the VTM area. These outfalls are directed to Moody Canyon and the low flow threshold does not warrant a medium or high designation unless addition observation of that reach is performed. Basin 300 is conveyed directly to the BMP at the downstream end of Beyer Road which is collected by a proposed outfall structure and hard piped to an outfall downstream. Please see the hydromodification exhibit in Attachment 2A of the VTM's PDPSWQMP report. A qualitative geomorphic channel assessment has been

performed for this outfall and is provided in Attachment 2C of the report titled, "Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Southwest Village Vesting Tentative Map (VTM)" dated December 15th, 2022. Additionally, as part of the Specific Plan, Outfall 9 has a low flow threshold of 0.5Q2. The outfall here has been extended to the bottom of the channel for Spring Canyon, which is a system that has a much larger tributary area then what is directed to this location from our project area. Directly downstream from Outfall 9 is the culvert the conveys flows to Mexico. Please refer to the Specific Plan report in Appendix C as well as Map Pocket 3 for additional information.

135. In at least one case, it appeared the upstream and downstream limits of a Domain of Analysis were the same. This will be reviewed further with the review of the low-flow threshold report. (New Issue)

The Domain of Analysis have been corrected and are included in Appendix C of the Specific Plan report.

136. When reviewing the downstream conveyance map, the receiving storm drains appeared disconnected or as dead-end storm drains on United States side of the border. This requires further review. (New Issue)

Comment noted. The exhibit has been revised to show a continuation of the storm drain network along with As-Builts for the existing storm drain conveyance system. Please find this in the VTM's PDPSWQMP Attachment 2C and the Specific Plan report Appendix C.

137. Please provide a response matrix indication how each comment is addressed and on which sheet. (New Issue)

Please use this document in place of a response matrix.

138. If you have any questions/comments please email Tariq Hasani at thasani@sandiego.gov. (New Issue)

Comment noted. RICK Engineering Company met with the City of San Diego on November 9, 2022; the result of that conversation has been presented here in the response to comments.

CONCEPTUAL DRAINAGE & WATER QUALITY SUMMARY
FOR
SOUTHWEST VILLAGE SPECIFIC PLAN

REVISION PAGE
July 15, 2022

This Conceptual Drainage and Water Quality Summary presents a revision to the report titled, "Conceptual Drainage & Water Quality Summary for Southwest Village Specific Plan," dated July 16th, 2020. Notably, outfalls discharging to the landslide complex to the west of the project site have been removed, requiring the approach for drainage and water quality to be adjusted and the site layout to be redesigned. Changes to the site design have been reflected in the updated analysis in this report and the site map for the post-project drainage condition. The water quality exhibits have also been revised to reflect the most recent changes. Please find the exhibits in Map Pocket 1, Map Pocket 2, and Map Pocket 3.

CONCEPTUAL DRAINAGE & WATER QUALITY SUMMARY
FOR
SOUTHWEST VILLAGE SPECIFIC PLAN

REVISION PAGE
July 16, 2020

This Conceptual Drainage and Water Quality Summary presents a revision to the report titled, "Conceptual Drainage & Water Quality Summary for Southwest Village Specific Plan," dated October 25th, 2019 pursuant to plan check review comments received from the City of San Diego (LDR-Engineering Review Cycle 5) in April 2020. Changes to the site design have been reflected in the updated analysis in this report and the site map for the post-project drainage condition and the water quality exhibit have been revised to reflect the most recent changes. Please find the exhibits in Map Pocket 1, Map Pocket 2, and Map Pocket 3.

CONCEPTUAL DRAINAGE & WATER QUALITY SUMMARY
FOR
SOUTHWEST VILLAGE SPECIFIC PLAN

REVISION PAGE
October 25, 2019

This Conceptual Drainage and Water Quality Summary presents a revision to the report titled, "Conceptual Drainage & Water Quality Summary for Southwest Village Specific Plan," dated March 29th, 2019 pursuant to plan check review comments received from the City of San Diego (LDR-Engineering Review Cycle 4) on May 7th, 2019. Changes to the site design have been reflected in the updated analysis in this report and the site map for the post-project drainage condition and the water quality exhibit have been revised to reflect the most recent changes. Please find the exhibits in Map Pocket 1, Map Pocket 2, and Map Pocket 3.

1.0 INTRODUCTION

This study presents the existing and proposed storm water drainage and storm water quality conditions within the Otay Mesa Southwest Village Specific Plan area (herein referred to as the Southwest Village Specific Plan). The Specific Plan designates land uses and rezone parcels within the proposed village area to accommodate future development consistent with the Otay Mesa Community Plan Update. This report addresses the drainage and storm water quality aspects of the Southwest Village Specific Plan on a programmatic level rather than at a parcel level. More specific information for future parcels will be developed as subsequent development plans are proposed by individual owners of land within the Specific Plan boundary.

The Southwest Village Specific Plan is a smaller portion of the overall community of Otay Mesa. Specifically, the Specific Plan boundary is generally located south of State Route 905, east of Interstate 805, north of the US-Mexico border, and immediately west of the northerly branch of Spring Canyon Creek. Refer to Figure 1 as well as the drainage study maps included in Map Pockets 1 and 2 for the limits of the Southwest Village Specific Plan area.

1.1 Background

This report builds on the work done previously for the Otay Mesa Community Plan Update (CPU) and its associated EIR. Specifically, the Otay Mesa CPU Drainage Study, that was part of the EIR, outlined the drainage and storm water quality requirements for future development within Otay Mesa and identified some of the regional drainage and flooding issues within the area. The report titled, “Drainage Study for the Otay Mesa Community Plan Update,” prepared by Kimley-Horn and Associates in April 2007, was supplemented by a companion study entitled “Review of Otay Mesa Drainage Studies,” prepared by Tetratech, which were referenced in the preparation of this Specific Plan.

The report provides some background and drainage challenges associated with the development of the Otay Mesa Community Plan Area. According to the referenced reports above, including a report titled, "Preliminary Drainage & Water Quality Summary," dated January 22, 2016, prepared by PDC, Otay Mesa was used for agriculture and farming for most of its early history. As industrial and commercial development started taking place in the 1960s, the City of San Diego recognized the need for a comprehensive drainage Master Plan for the Mesa. The topography of the majority of the area is mostly flat and some of the areas experience flooding during moderate storm events, particularly within the East Watershed (per the Watershed Map in the CPU Drainage Study). Due to this, there was concern that the new development would increase the stormwater runoff crossing the border into Mexico. In 1987, the City of San Diego Council approved a contract to prepare the Otay Mesa Master Drainage Plan and published a Notice to "All Private Engineers" that established drainage requirements for development within the East Watershed of Otay Mesa. (Refer to page 2 of the CPU Drainage Study). The Notice required no increase in the rate of stormwater runoff from the property after development by the construction of stormwater detention basins. Most of the drainage analysis associated with the CPU Drainage Study focused on the East Watershed, but the CPU Drainage Study also addressed the other areas within the CPU boundary. The Southwest Village Specific Plan is within the West Watershed, which is less developed than the East Watershed but still has some of the same drainage challenges. Per Section VII of the CPU Drainage report, the following describes the recommended drainage design criteria for future development within the West Watershed (which includes the Specific Plan Area):

> *The West Watershed consists of smaller Mesa-top watersheds that drain into the tributary canyons of Spring Canyon. All of the flow from the watershed flows into Mexico at the Spring Canyon concentration point. Detention basins will be required to reduce the post-development peak flows to predevelopment levels for the 50-year and 100-year storm. If the detention basins concentrate flows at the upper edge of canyons, care must be taken to ensure that erosion potential is not increased downstream.*

Therefore, the requirements of the West and East watersheds are different. While developments in the East watershed requires conformance with the Notice to "All Private

Engineers", the West watershed is not subject to the same requirements, but it is subject to the 50-year and 100-year storm detention requirement, as outlined in the above paragraph.

Subsequent to the preparation of the previous Otay Mesa Drainage Studies, Caltrans has built the new State Route 905 and there have been other changes and development within the watershed. The purpose of this report is to establish the guidance for future development within the Southwest Village Specific Plan boundary. The guidance will require compliance with the overall goals of the CPU (reduce post-development peak flows) and will also require compliance with the applicable stormwater quality regulations.

San Ysidro Landslide Complex Considerations

Following conventional drainage design, pre-project drainage basins were delineated, and the proposed project grading was coordinated to ensure that the area of the post-project drainage basins matched that of the pre-project areas. Outfall locations were carefully selected at points of concentration around the project site where the existing topography narrows to form existing channels. However, concerns were raised about the stability of the San Ysidro landslide complex that borders the southwest margin of VTM-1 and the potential impact to this by an increase in stormwater volume from the proposed project site.

To understand this further, Geocon performed geotechnical investigations that penetrated the landslide in three locations. Based on this information, two cross-sections were developed for use in geologic characterization and the performance of slope stability analysis. With supplementary reports from both Rick Engineering ("Landslide Hydrology Analysis for Southwest Village," dated April 16, 2021) and a Groundwater consultant from Dudek ("Initial Assessment of Groundwater Conditions at the Southwest Village Site, Otay Mesa and Surrounding Areas, San Diego County," dated June 14, 2021), Geocon prepared a report titled, "Supplemental Geotechnical Investigation and Slope Stability Analysis: Southwest Village VTM-1 San Diego, California," dated June 25, 2021. In Section 5 of the report, Geocon concludes,

5.11 Several storm water outfall locations were contemplated during the original project design. These features were proposed to discharge storm runoff collected from the

project into pronounced drainages within the landslide complex. Although the infiltration data collected from the discharge locations supported a short-term discharge without adverse effects, the potential for scour and injection of storm water into the slide mass during extreme storm events resulted in a requirement to redesign the storm drain system to discharge outside landslide areas.

Per the conclusions of this report, the drainage area that discharged to the west in the existing condition has now been diverted away from the San Ysidro landslide complex in the proposed condition and the outfalls have been relocated. Refer to section 3.0 of this report, Proposed Drainage Conditions, which will discuss proposed drainage patterns in more detail. Map Pocket 2 also has a map of the post-project condition of the site showing outfall locations and tributary area.

1.2 Project Description

The Southwest Village Specific Plan (Specific Plan) provides a comprehensive policy framework intended to guide future development in Southwest Village, consistent with the Otay Mesa Community Plan (OMCP) and City of Villages Strategy. The Specific Plan, which encompasses approximately 490 acres, will allow up to 5,130 attached and detached residences, and will facilitate creation of a new village anchored by up to 175,00 square feet of commercial and retail uses in a Mixed-Use Village Core. The Specific Plan would provide public facilities including dedication of a new elementary school, more than 36 acres of developed parks in addition to approximately 185 acres of trails, natural open space, and habitat conservation. Access to the Specific Plan area will be via two main access points, Caliente Avenue to the north and from an extension of Beyer Boulevard to the west, connecting the Specific Plan area to San Ysidro.

The Specific Plan identifies a range of allowable residential densities for each planning area to allow for flexibility in future planning and design. The following land use designations are proposed:

- Medium-Low Density Residential allowing 8 to 22 dwelling units per acre
- Medium Density Residential allowing 15 to 29 dwelling units per acre
- Medium-High Density Residential allowing 20 to 44 dwelling units per acre
- Mixed-Use allowing up to commercial and retail uses at a maximum Floor Area Ratio (FAR) of 2.0 and multi-family attached residential units at a density range of 20 to 44 dwelling units per acre

Implementation of the Specific Plan will require a number of discretionary approvals including an amendment to the OMCP to remove the Neighborhood Village designation and designate Specific Plan land uses and circulation changes, a rezone to implement Specific Plan land uses, a Multi-Habitat Planning Area (MHPA) Boundary Adjustment, and approval of an update to the Otay Mesa Public Facilities Financing Plan to include new parks, a sewer pump station, and other public facilities.

For the purpose of the environmental analysis included in this report, a full buildout scenario for Specific Plan was analyzed. As the Specific Plan is under multiple property ownerships and the timing of buildout is not known at this time, the ultimate mix of residential densities cannot be known with certainty. However, the following assumptions consistent with the Specific Plan land use framework were used in the environmental analysis that identifies build-out of up to:

- 1,424 medium-low density residential units (8-22 du/ac)
- 2,237 medium density residential units (15-29 du/ac)
- 1,469 medium-high density and residential mixed-use units (20-44 du/ac)

In addition to adoption of the Specific Plan, the northwest portion of the Specific Plan is proposed for development with residential uses. A Vesting Tentative Map (VTM), Site Development Permit, and MHPA Boundary Adjustment are requested in order to develop approximately 60 acres within Planning Areas 8 through 14 to implement a portion of the residential components of the Specific Plan. The VTM would provide for up to 1,315 multi-family and single-family residential units, including 543 single family units, 490 multi-family units (15-29 du/ac), and 282 multi-family units (20-44 du/ac). The environmental analysis considers 1,315 units as a conservative unit count as the ultimate number of residential units is refined through the planning process. The actual VTM unit count is currently 800. The VTM single-family units will be processed as a small lot subdivision consistent with Section 143.0365 which allows the subdivision of multi-family zoned land, consistent with the density and standards of the Specific Plan zone, for the construction of single dwelling units. Thus, while the VTM will identify all units as multi-family due to the proposed multi-family lotting, the 543 small lots are considered single-family for purposes of the environmental analysis. Concurrent with implementation of the VTM, Beyer Boulevard will be graded to its full width and improved as a two-lane road with bicycle facilities.

1.3 Figure 1: Vicinity Map

2.0 EXISTING DRAINAGE CONDITIONS

Topography within the project site is characterized by mostly gently sloping areas (2% to 9% slopes on the mesa tops), with portions of the perimeter of the property within steep canyon areas. There are currently little to no drainage improvements within the specific plan boundary. Runoff from Basins 600 and 800 through 1300 (as identified in the existing condition drainage study map in Map Pocket 1) drains to the south to Spring Canyon Creek either directly or via Dillon Canyon, which is tributary to Spring Canyon Creek. Runoff is conveyed south within Spring Canyon Creek towards an existing culvert at the Spring Canyon concentration point along the border with Mexico. Based upon the available information, it is assumed that the runoff is conveyed via a system of storm drain and open channels to a concrete lined reach of the Tijuana River on the Mexican side of the border.

The northwesterly portion of the Specific Plan area, which includes Basins 100 through 300 and Basin 1400 drain to the northwest to Moody Canyon Creek, located directly south of the existing Otay Mesa Road. After entering Moody Canyon, the runoff is then conveyed west into a culvert underneath Enright Drive. After crossing Enright Drive, the runoff commingles with other runoff draining from downstream areas including Caltrans right-of-way and then ultimately drains to the Tijuana River.

The southwesterly portion of the Specific Plan area, including Basins 400, 500, and 700, drains in a southwesterly direction to collection points in the vicinity of the intersection of Beyer Blvd and San Ysidro Blvd. From these locations, runoff is conveyed in an existing storm drain system (pipes and channels) to the Tijuana River by the border line with Mexico.

It should be noted that the Southwest Village Specific Plan area is divided nearly in half between two separate hydrologic units. Planning Areas that drain to Moody Canyon Creek are generally within the San Ysidro hydrologic unit (911.11), which drains to the Tijuana River on the United States side of the border. Planning Areas that drain to Dillon Canyon and Spring Canyon Creek are generally within the Water Tanks hydrologic unit (911.12), which drains to the Tijuana River on the Mexican side of the border.

As part of this study, an existing condition conceptual hydrologic analysis was prepared to key outfall locations (points of interest). A summary of the 100-year existing condition conceptual hydrology is presented in Table 2-1. For more detailed information regarding existing condition hydrology, refer to Appendix A for the conceptual modified rational method outputs and the existing condition drainage map in Map Pocket 1.

Floodplains

The project is located within an area of the non-printed FEMA Firm Panel 06073C21760G. Per the FIRM index sheet, the panel is not printed because there are no special flood hazard areas within the panel sheet. Therefore, processing of technical reports with FEMA should not be required. It should be noted that although there are no FEMA special flood hazard areas, there may be areas of localized flooding in the canyons and other drainage concentration points.

Table 2-1: Southwest Village – Existing Condition Hydrologic Summary (Conceptual)

Rational Method for Southwest Village Specific Plan (Pre-Project Condition)						
Drainage Basin ID	**Planning Area ID(s)**	**Area (Ac)**	**% Impervious**	**Weighted Runoff Coefficient**	**T_c (min)**	**Q_{100} (cfs)**
100	10	17.2	0%	0.45	15.3	22.3
200	8 - 10, 24 - 27	61.0	0%	0.45	15.9	77.7
300	11 - 13	27.6	0%	0.45	15.0	36.1
400	12	7.3	0%	0.45	13.8	9.8
500	14 - 15	14.3	0%	0.45	16.3	18.0
600	18 - 23	74.0	0%	0.45	18.8	94.6
700	15 - 17	36.5	0%	0.45	16.7	41.4
800	15 & 18	3.7	0%	0.45	14.3	4.5
800A	15 & 18	4.5	0%	0.45	12.0	6.0
800B	18	1.9	0%	0.45	11.6	2.6
900	18	6.9	0%	0.45	14.5	8.4
1000	1, 2, 7	59.6	0%	0.45	13.4	85.3
1100	2, 3, 6	21.6	0%	0.45	16.2	28.5
1200	4 - 5	21.6	0%	0.45	21.7	24.0
1300	4 - 5	15.9	0%	0.45	15.5	21.0
1400[3]	N/A	319.9	0%	0.45	24.2	337.0

1. Weighted Runoff Coefficients were calculated based on guidance from the City of San Diego Drainage Design Manual, dated January 2017.
2. Time of Concentration (T_c) was estimated using the City of San Diego Drainage Design Manual, dated January 2017.
3. Basin 1400 includes drainage tributary to the existing Beyer Road, which includes the area and Q100 for Basin 100, 200, and 300.

3.0 PROPOSED DRAINAGE CONDITIONS

For developed conditions, the Specific Plan area will consist of high-density residential developments, mixed use developments, commercial/retail developments, school developments, public roads, public parks, and open space areas. The proposed grading concepts being developed for the Specific Plan have been graded to generally maintain the same drainage patterns as in the existing condition where possible, however, due to the presence of the San Ysidro Landslide complex, the basins previously draining to the west in the existing condition (Basin 400, 500, 700, and parts of 800) are now being diverted either to the north and will be piped down the proposed storm drain along the future Beyer Blvd. alignment or Spring Canyon to the south. This is based on the recommendation of the geotechnical engineer, Geocon, in the report titled, "Supplemental Geotechnical Investigation and Slope Stability Analysis: Southwest Village VTM-1 San Diego, California," dated June 25, 2021.

Runoff from Planning Areas 1-7 and 15-23 (as identified on the proposed condition drainage study map in Map Pocket 2) drains south to Spring Canyon Creek either directly or via Dillon Canyon, which is tributary to Spring Canyon Creek. Runoff is conveyed south within Spring Canyon Creek towards an existing culvert at the Spring Canyon concentration point along the border with Mexico. Based upon the available information, it is assumed that the runoff is conveyed via a system of storm drain and open channels to a concrete lined reach of the Tijuana River on the Mexican side of the border.

The northwesterly portion of the Specific Plan area, which includes Planning Areas 8-10, drains to the west to Moody Canyon Creek, located directly south of the existing Otay Mesa Road. After entering Moody Canyon, the runoff is then conveyed west into an existing 54-inch storm drain underneath Enright Drive. After crossing Enright Drive, the runoff commingles with other runoff draining from downstream areas including Caltrans right-of-way and then ultimately drains to the Tijuana River. Drainage from Planning Areas 11-14 will drain to the north and be conveyed to the west in a proposed storm drain within the proposed Beyer Blvd. alignment.

Similar to the existing condition, a proposed condition conceptual hydrologic analysis was prepared to key outfall locations (points of interest). A summary of the 100-year proposed condition conceptual hydrology is presented in Table 3-1. For more detailed information regarding the hydrology, refer to Appendix B for the conceptual modified rational method outputs and the proposed condition drainage map in Map Pocket 2.

Potential storm drain outfall locations are illustrated on the proposed condition drainage map to identify potential suitable major discharge locations. The final location of all of the outfalls will be developed during future site planning efforts, and the specific locations may be further refined to minimize environmental disturbance, erosion potential, or other refinements to the grading plan.

Drainage design policies and procedures for the City of San Diego are given in the City of San Diego's "Drainage Design Manual," dated January 2017. This Manual provides information to assist in the processing and review of applications. The "Drainage Design Manual" provides a guide for designing drainage and drainage-related facilities for developments within the City of San Diego. New development projects for the Specific Plan Area will be required to adhere to these existing criteria. The City of San Diego will be responsible for reviewing hydrologic and hydraulic studies and design features for conformance to criteria given in the "Drainage Design Manual" for every map or permit for which discretionary approval is sought from the City of San Diego. These project specific studies for each development will need to address potential impacts to downstream storm drainage facilities with sufficient detail to support the discretionary action. In addition, the new development projects will need to be able to demonstrate that the 50-year and 100-year detention requirements have been addressed (in order to satisfy the design criteria of the CPU Drainage Study). Additionally, the drainage area flowing into Mexico at the Spring Canyon concentration point and will need to comply with the US/Mexico International flood control detention requirements (i.e. – 5, 10, 25, 50, & 100-year storm events).

Therefore, for projects that propose an increase in imperviousness, detention mitigation will likely be required. In addition to providing detention for peak flows, storm water quality and hydromodification requirements will also need to be addressed. Based on preliminary estimates, the hydromodification mitigation volumes may govern the size of any detention facilities, so it is possible that a basin sized to meet hydromodification requirements will likely also meet the peak flow detention requirement. These assumptions will need to be confirmed during the development of future site plans.

Table 3-1: Southwest Village – Proposed Condition Hydrologic Summary (Conceptual)

Rational Method for Southwest Village Specific Plan (Post Project Condition)						
Drainage Basin ID	**Planning Area ID(s)**	**Area (Ac)**	**% Impervious**	**Weighted Runoff Coefficient**	**T_c (min)**	**Q_{100} (cfs)**
100	10	16.5	25%	0.58	12.9	29.8
200	8 – 10, 24 - 27	60.7	29%	0.59	14.4	158.0
300[4]	11-14	39.5	72%	0.81	10.3	110.0
600	18 - 23	67.0	80%	0.84	19.5	134.6
900[4]	15 - 18	53.0	80%	0.84	24.9	99.3
1000	1, 2, 7	49.7	80%	0.84	13.2	117.8
1100	2, 3, 6	18.4	80%	0.84	11.0	47.0
1200	4 - 5	28.3	80%	0.84	11.2	74.9
1300	4 - 5	21.1	80%	0.84	20.1	39.5
1400	N/A	346.1	16%	0.53	22.9	429

1. Weighted Runoff Coefficients were calculated based on guidance from the City of San Diego Drainage Design Manual, dated January 2017.
2. Time of Concentration (T_c) was estimated using the City of San Diego Drainage Design Manual, dated January 2017.
3. The area in that defines Basin 1400, include the area from Basin 100, 200, and 300. The contributing Q100 from Basin 100, 200, and 300 in the post-project condition is calculated with the detained Q100.
4. Pre-project Drainage Basin 400 and approximately half of Basin 500 have been incorporated into the post-project Basin 300. Pre-project Drainage Basin 700, 800, and approximately half of Basin 500 have been incorporated into post-project Drainage Basin 900. This was done to avoid discharging to the landslide complex to the west of the project site.

4.0 PROPOSED WATER QUALITY AND HYDROMODIFICATION MANAGEMENT STRATEGIES

The Specific Plan will accommodate a regional water quality and hydromodification control concept that will maintain existing drainage patterns and will serve the drainage conveyance needs of the future build-out of the community. There are a few design approaches that the storm water quality and hydromodification management requirements can be addressed.

Since the Southwest Village Specific Plan area in its current condition is almost entirely undeveloped, it is recommended that the master plan concept for storm drain design be developed concurrently with the land use planning because the storm drain design and pollutant/hydromodification control BMP locations will directly affect the layout of the community. Also, because the requirements of peak flow drainage, water quality, and hydromodification control are so interdependent, it is important to plan in advance to anticipate the land area requirements for detention, water quality, and hydromodification control requirements.

There are multiple landowners within the Specific Plan area, and it is likely that potential development would be phased over several years. Any proposed project would need to satisfy the requirements of the City of San Diego Storm Water Standards Manual at the time of permit issuance. Pursuant to the 2013 Municipal Storm Water (MS4) Permit requirements (Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100), the City of San Diego first updated their Storm Water Standards Manual to incorporate the permit requirements in February of 2016. The most recent manual is the one dated May, 2021. For the purposes of this report, it is anticipated that the majority of future development projects will be subject to the new stormwater requirements effective May 2021. However, the Municipal Storm Water Permit is generally re-issued every 5 years, so developments that are proposed after the next permit cycle may be subject to future MS4 Permit requirements that are not currently known. The discussion below presents the considerations for complying with the requirements pursuant to the 2013 MS4 Permit for San Diego Region (Order No.

R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100) and the City of San Diego Storm Water Standards, dated May 2021.

The 2013 MS4 Permit requires all development and redevelopment projects to implement storm water source control and site design practices to minimize the generation of pollutants. Additionally, the 2013 MS4 Permit requires new development and significant redevelopment projects that exceed certain size thresholds (referred to as Priority Development Projects) to implement structural storm water Best Management Practices (Structural BMPs) to reduce pollutants in storm water runoff. In addition, Priority Development Projects (PDPs) are also required to address hydromodification management requirements to control runoff volumes and flow durations (hydromodification requirements) for non-exempt projects. The hydromodification management requirements also include addressing potential critical course sediment yield areas, if they are applicable to the future planning areas. Based on the San Diego regional mapping document, there is a few potential critical course sediment yield areas that are identified within the Southwest Village Specific Plan area. Where the PCCSYA exists, a more detailed analysis may be required prior to or during the final engineering (construction document) stage to address the requirements.

The City of San Diego Storm Water Standards (a.k.a "BMP Design Manual") and permit requirements identify a specific hierarchy for selection of structural pollutant control BMPs. In particular, the first priorities for pollutant control BMPs are BMPs that achieve infiltration and harvest and use of stormwater. This requires that an infiltration feasibility analysis be conducted along with an input from a geologist/geotechnical engineer. If it is not technically feasible to implement infiltration and harvest and use BMPs for the full design capture volume (DCV) onsite for a Priority Development Project, then the project shall utilize biofiltration BMPs for the remaining volume not reliably retained. Biofiltration BMPs must be sized to treat 1.5 times the DCV not reliably retained onsite or must be sized to treat the DCV not reliably retained onsite with a flow-thru design that has a total volume, including pore spaced and pre-filter detention volume, sized to hold at least 0.75 times the portion of the DCV not reliably retained onsite. Or the biofiltration BMPs must meet proprietary

biofiltration BMP sizing criteria and other requirements, as outlined in the City of San Diego Storm Water Standards. If none of these BMPs are proposed for a Priority Development Project (PDP), the project applicant can use an alternate BMP (flow-thru treatment control BMP) in combination with an Alternative Compliance approach, which will require approval through the agency and will require providing mitigation offsite in addition to providing BMPs onsite.

4.1 Opportunities and Constraints

The Specific Plan area from a storm water quality and hydromodification management standpoint has some constraints and minimal opportunities from a land planning perspective. One major constraint is that the project is local adjacent to the San Ysidro landslide complex and per recommendations of the geotechnical engineer and the ground water consultant, no flows in the post-project condition shall be discharged to this area. This requires diversion of area either north to Moody Canyon or south to Spring Canyon, requiring HMP and WQ facilities to be increased in size to mitigate for the additional area. Another constraint is that the Southwest Village Specific Plan is comprised of loamy and clayey soils (Hydrologic Soil Group classification of Type "D" soils). See Appendix D for an exhibit detailing soil types within the Specific Plan area. This soil condition limits the possibility of the use of retention and/or partial retention BMPs onsite. Therefore, biofiltration BMPs are more likely anticipated for a pollutant control BMP approach. Additionally, the presence of Type D soils at the project site severely limits the feasibility of implementing full or partial infiltration BMPs on site. Another constraint (or requirement) is that the project is not exempt from hydromodification requirements. Exemption from hydromodification requirements, based on the May 2021 Storm Water Standards Manual, is provided if the project meets one or more of the following criteria:

- the project is not a PDP;
- the project will discharge runoff directly to existing underground storm drains that discharge directly to water storage reservoirs/lakes/enclosed embayments or the Pacific Ocean;

- the project will discharge runoff directly to conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs/lakes/enclosed embayments or the Pacific Ocean; and/or
- the project will discharge runoff directly to an area identified by the Copermittees as appropriate for an exemption by the WMAA for the watershed in which the project resides.

It is anticipated that future projects within the Southwest Village Specific Plan boundary will be subject to hydromodification control requirements. From a planning perspective, there are also spatial and timing constraints due to the multiple outlet locations and multiple landowners with varying interests and land holdings. Steep topography may limit the ability to develop some areas within the perimeter canyon areas. Due to steep terrain, there may be additional geological constraints pending further analysis by the project-specific geotechnical engineer/geologist. However, the steepness of the canyon areas near the proposed outfall locations may provide an opportunity to utilize the available head to use deep detention and/or deep biofiltration basins (if allowed by the geotechnical engineer) to minimize the land areas required for treatment and detention.

4.2 Recommended BMP Strategy

Future development of the Specific Plan area will require detention facilities for peak flows, water quality treatment, and hydromodification management controls. To address water quality concerns, LID Site Design and Source Control BMPs will be incorporated into each project's site plans in accordance with the City's Stormwater Standards. Permanent Structural Pollutant Control BMPs will also be incorporated into the future projects within the Specific Plan Area in accordance with the City's Stormwater Standards and may include regional and/or project-specific treatment control BMPs. These facilities may also be used for detention and/or hydromodification requirements, in addition to fulfilling treatment requirements. These detention facilities can be designed either as regional facilities to accommodate the post-project drainage from multiple developments, or as individual on-lot facilities to mitigate onsite post-project flows on a project-by-project basis, or a combination of the two approaches. The Specific Plan land use plan has identified potential pollutant

control BMP locations based on the existing drainage patterns, with the understanding that future developments will generally preserve existing drainage patterns. The locations of the BMPs and the final number of BMPs will depend on future regional planning to best determine the optimum design to best serve the needs of the Specific Plan Area.

As part of the initial due diligence phase for the Specific Plan, several drainage options were considered as possible scenarios for future site planning. It is recommended that at least a few alternatives be explored before selecting the most appropriate design approach for each regional drainage area within the Specific Plan area. The recommended BMP strategy options for future study include, but not limited to:

1) At the downstream end of each regional drainage area, incorporate hydromodification and pollutant control requirements in a combined hydromodification/pollutant control biofiltration basin.
2) At the downstream end of each regional drainage area, implement hydromodification control BMP(s) in series with a downstream pollutant control BMP to achieve pollutant control requirements. This can be achieved by use of a subterranean detention vault for hydromodification control with a Modular Wetland System (or similar) downstream to provide pollutant control.
3) Implement controls in any of the above categories but participate in an alternative compliance project to minimize onsite impacts of compliance.

In comparing the alternative strategies, many of the options listed above are likely not the most optimum approach for most cases within the Specific Plan area. For example, there are several benefits for treating runoff in a regional fashion, including the elimination of duplicate storm drain systems, maximizing the economies of scale with larger BMPs, respecting drainage areas through various build-out scenarios, reduced clogging potential, and ease of maintenance. Therefore, for the purpose of this Specific Plan discussion with respect to pollutant control and hydromodification requirements, it is assumed that Option 1 would be preferred, but this does not preclude other alternatives from moving forward if it is determined at a later date that other options are preferred. Due to the complexity of designs for hydromodification facilities, a simplistic approach was needed to quantify the land area

that could be lost for development for initial planning purposes. For rough approximation purposes, the default sizing factor method was used to show what size of a biofiltration basin would be required to comply with both water quality and hydromodification requirements.

For hydromodification analyses, the default low flow threshold is 0.1Q2 for outfall locations where a geomorphic channel assessment has not been performed. A higher low-flow threshold of 0.3Q2 or 0.5Q2 could potentially be used for this project in the future if a geomorphic channel assessment analysis (SCCWRP Analysis) is completed for the project's discharge locations and the results indicate a medium or low susceptibility to erosion for the project's receiving streams. Based on our current understanding, susceptibility to erosion is high within Moody Canyon and Dillon Canyon. It is recommended that the hydromodification management analysis for future planning areas within the Southwest Village Specific Plan is anticipated to use the default low-flow threshold of 0.1Q2, unless a geomorphic channel assessment is performed.

Due to the large tributary watershed, a geomorphic channel assessment was performed for Spring Canyon, between Outfall 9 and the international border to the south and it is recommended that a low-flow threshold of 0.5Q2 be used for hydromodification analysis. Similarly, flows from Drainage Basin 300 and the parts of Drainage Basin 1400 that are associated with the proposed Beyer roadway will be conveyed via a hardened system from the project site to the existing storm drain system where flows are conveyed through open channels and culverts until they discharge to the Tijuana River Estuary, a location known for deposition and sedimentation. It is recommended that a low-flow threshold of 0.5Q2 be used for hydromodification analysis. Please refer to Attachment C of this report and the report titled, "Priority Development Project Storm Water Quality Management Plan for Southwest Village Vesting Tentative Map," dated March 2022 (and any revisions thereafter).

4.3 Conceptual Sizing Results

Each potential storm water management basin was identified on the Specific Plan DMA Exhibit and sized based on rough approximation methods. Based on our past experience and our understanding of the City Storm Water Standards (May 2021 Edition), the approximation methods included a required footprint estimation based on a percentage of the drainage area that each basin serves and an estimation of the required storage volume for hydromodification control based on two times the design capture volume (DCV). The results are shown on the DMA Exhibit in Map Pocket 3 for the default basin sizes and the supporting conceptual calculations are included in Appendix C.

The sizing and design of these facilities will be designed in more detail during the future entitlement phases. The basin sizing will be studied in the future Drainage studies and Storm Water Quality Management Plans to be prepared during the future entitlement projects. These future studies will help determine the location and sizing of the areas that will need to be set aside for drainage/water quality purposes. It is recommended that the future site-specific studies use continuous simulation models to potentially reduce the basin sizes necessary to comply with the hydromodification requirements. It has been confirmed with City staff that the City will allow the use of the Lindberg gauge or Bonita gauge rainfall data to be used instead of the Lower Otay gauge due to the higher quality of the data in comparison to the Lower Otay gauge and the closer resemblance of the average annual rainfall relationship per Figure 1-2 of the County Drainage Design Manual.

APPENDIX A

Modified Rational Method Output
[Pre-project]

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                          619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 100 EXISTING CONDITION                                           *
 **************************************************************************

  FILE NAME: SOB100E.RAT
  TIME/DATE OF STUDY: 08:37 01/24/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   107.00
  UPSTREAM ELEVATION(FEET) =    531.00
  DOWNSTREAM ELEVATION(FEET) =    530.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   12.379
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.188
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.43

******************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    110.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM(FEET) =    500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0503
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.888
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.59
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   2.77
  Tc(MIN.) =  15.15
  SUBAREA AREA(ACRES) =     6.00       SUBAREA RUNOFF(CFS) =    7.80
  TOTAL AREA(ACRES) =      6.30         PEAK FLOW RATE(CFS) =       8.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   4.41
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   703.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    435.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   236.00   CHANNEL SLOPE =  0.2754
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.830
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.44
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   0.72
  Tc(MIN.) =  15.87
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    0.89
  TOTAL AREA(ACRES) =      7.00         PEAK FLOW RATE(CFS) =       9.12

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   5.72
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =   939.00 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.830
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 SUBAREA AREA(ACRES) =    3.50   SUBAREA RUNOFF(CFS) =    4.46
 TOTAL AREA(ACRES) =     10.50   TOTAL RUNOFF(CFS) =   13.58
 TC(MIN.) =  15.87

**************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    180.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    435.00  DOWNSTREAM(FEET) =    410.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   427.00   CHANNEL SLOPE =  0.0585
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.734
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     17.45
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.92
 AVERAGE FLOW DEPTH(FEET) =   0.28   TRAVEL TIME(MIN.) =   1.20
 Tc(MIN.) =  17.07
 SUBAREA AREA(ACRES) =     6.30       SUBAREA RUNOFF(CFS) =    7.75
 TOTAL AREA(ACRES) =     16.80         PEAK FLOW RATE(CFS) =      21.33

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   6.36
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    180.00 =  1366.00 FEET.
==========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     16.80  TC(MIN.) =     17.07
 PEAK FLOW RATE(CFS)   =     21.33
==========================================================================
==========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                          619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                     *
* 100-YEAR, 6-HOUR STORM EVENT                                            *
* BASIN 200 EXISTING CONDITION                                            *
 ****************************************************************************

  FILE NAME: SOB200E.RAT
  TIME/DATE OF STUDY: 08:42 01/24/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
  UPSTREAM ELEVATION(FEET) =    498.00
  DOWNSTREAM ELEVATION(FEET) =    497.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.602
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.274
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.29

******************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    210.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    497.00  DOWNSTREAM(FEET) =    471.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   863.00   CHANNEL SLOPE =  0.0301
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.828
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.35
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   4.29
  Tc(MIN.) =  15.90
  SUBAREA AREA(ACRES) =     9.20       SUBAREA RUNOFF(CFS) =   11.71
  TOTAL AREA(ACRES) =      9.40         PEAK FLOW RATE(CFS) =      12.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   4.07
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =   962.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    471.00  DOWNSTREAM(FEET) =    415.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   290.00   CHANNEL SLOPE =  0.1931
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.776
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.39
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   0.65
  Tc(MIN.) =  16.55
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    0.87
  TOTAL AREA(ACRES) =     10.10         PEAK FLOW RATE(CFS) =      12.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   7.65
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =  1252.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.776
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  SUBAREA AREA(ACRES) =   26.40   SUBAREA RUNOFF(CFS) =   32.98
  TOTAL AREA(ACRES) =     36.50   TOTAL RUNOFF(CFS) =   45.86
  TC(MIN.) =  16.55

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    230.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =    400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.0386
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.707
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     49.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.52
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   0.86
  Tc(MIN.) =  17.41
  SUBAREA AREA(ACRES) =     5.30       SUBAREA RUNOFF(CFS) =    6.46
  TOTAL AREA(ACRES) =     41.80         PEAK FLOW RATE(CFS) =      52.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   7.71
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =  1641.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.707
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  SUBAREA AREA(ACRES) =   14.70   SUBAREA RUNOFF(CFS) =   17.91
  TOTAL AREA(ACRES) =     56.50   TOTAL RUNOFF(CFS) =   70.22
  TC(MIN.) =  17.41

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    280.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    400.00  DOWNSTREAM(FEET) =    390.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   259.00   CHANNEL SLOPE =  0.0386
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.658
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     73.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.07
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   0.61
  Tc(MIN.) =  18.02
  SUBAREA AREA(ACRES) =     4.90       SUBAREA RUNOFF(CFS) =    5.86
  TOTAL AREA(ACRES) =     61.40         PEAK FLOW RATE(CFS) =      76.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   7.15
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    280.00 =  1900.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     61.40  TC(MIN.) =     18.02
  PEAK FLOW RATE(CFS)   =     76.08
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 300 EXISTING CONDITION                                           *
 **************************************************************************

  FILE NAME: SOB300E.RAT
  TIME/DATE OF STUDY: 16:36 01/25/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   109.00
  UPSTREAM ELEVATION(FEET) =    498.00
  DOWNSTREAM ELEVATION(FEET) =    497.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   12.571
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.167
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.29

******************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    310.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    497.00  DOWNSTREAM(FEET) =    474.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   611.00   CHANNEL SLOPE =  0.0376
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.860
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.47
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   2.93
  Tc(MIN.) =  15.51
  SUBAREA AREA(ACRES) =     7.90       SUBAREA RUNOFF(CFS) =   10.17
  TOTAL AREA(ACRES) =      8.10        PEAK FLOW RATE(CFS) =      10.45

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   4.20
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =   720.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    474.00  DOWNSTREAM(FEET) =    427.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =  0.1382
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.770
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     11.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.05
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.12
  Tc(MIN.) =  16.63
  SUBAREA AREA(ACRES) =     1.20       SUBAREA RUNOFF(CFS) =    1.50
  TOTAL AREA(ACRES) =      9.30        PEAK FLOW RATE(CFS) =      11.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   5.29
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =  1060.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.770
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  SUBAREA AREA(ACRES) =    9.80   SUBAREA RUNOFF(CFS) =   12.21
  TOTAL AREA(ACRES) =     19.10   TOTAL RUNOFF(CFS) =   24.16
  TC(MIN.) =  16.63

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    380.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    427.00  DOWNSTREAM(FEET) =    387.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   401.00   CHANNEL SLOPE =  0.0998
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.689
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     28.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.60
  AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   1.01
  Tc(MIN.) =  17.64
  SUBAREA AREA(ACRES) =     7.00       SUBAREA RUNOFF(CFS) =    8.47
  TOTAL AREA(ACRES) =     26.10         PEAK FLOW RATE(CFS) =      32.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   6.88
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    380.00 =  1461.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    380.00 TO NODE    380.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.689
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  SUBAREA AREA(ACRES) =    1.50   SUBAREA RUNOFF(CFS) =    1.81
  TOTAL AREA(ACRES) =     27.60   TOTAL RUNOFF(CFS) =   34.45
  TC(MIN.) =  17.64
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     27.60  TC(MIN.) =     17.64
  PEAK FLOW RATE(CFS)   =     34.45
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 400A EXISTING CONDITION                                          *
 **************************************************************************

  FILE NAME: SOB400AE.RAT
  TIME/DATE OF STUDY: 16:42 01/25/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   112.00
  UPSTREAM ELEVATION(FEET) =    502.00
  DOWNSTREAM ELEVATION(FEET) =    500.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.206
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.427
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.31

******************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    410.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    478.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   507.00   CHANNEL SLOPE =  0.0434
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.127
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.10
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   2.73
  Tc(MIN.) =  12.93
  SUBAREA AREA(ACRES) =     4.30       SUBAREA RUNOFF(CFS) =    6.05
  TOTAL AREA(ACRES) =      4.50         PEAK FLOW RATE(CFS) =       6.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   3.88
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =   619.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.127
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    1.27
  TOTAL AREA(ACRES) =      5.40   TOTAL RUNOFF(CFS) =    7.63
  TC(MIN.) =  12.93
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      5.40  TC(MIN.) =     12.93
  PEAK FLOW RATE(CFS)   =      7.63
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                     *
* 100-YEAR, 6-HOUR STORM EVENT                                            *
* BASIN 400B EXISTING CONDITION                                           *
 ****************************************************************************

  FILE NAME: SOB400BE.RAT
  TIME/DATE OF STUDY: 16:47 01/25/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    402.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   107.00
  UPSTREAM ELEVATION(FEET) =    502.00
  DOWNSTREAM ELEVATION(FEET) =    501.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   12.379
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.188
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.14

******************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    420.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    501.00  DOWNSTREAM(FEET) =    488.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   319.00   CHANNEL SLOPE =  0.0408
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.936
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.32
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   2.29
  Tc(MIN.) =  14.67
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    2.38
  TOTAL AREA(ACRES) =      1.90         PEAK FLOW RATE(CFS) =       2.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   2.81
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    420.00 =   426.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      1.90  TC(MIN.) =     14.67
  PEAK FLOW RATE(CFS)   =      2.52
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 500 EXISTING CONDITION                                           *
 **************************************************************************

  FILE NAME: SS05HE00.RAT
  TIME/DATE OF STUDY: 08:26 02/13/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   118.00
  UPSTREAM ELEVATION(FEET) =    499.00
  DOWNSTREAM ELEVATION(FEET) =    498.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   13.430
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.073
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.41

******************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    510.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    498.00  DOWNSTREAM(FEET) =    475.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   688.00   CHANNEL SLOPE =  0.0334
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.793
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.94
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   2.91
  Tc(MIN.) =  16.34
  SUBAREA AREA(ACRES) =    14.00       SUBAREA RUNOFF(CFS) =   17.59
  TOTAL AREA(ACRES) =     14.30         PEAK FLOW RATE(CFS) =      18.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   4.71
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =   806.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     14.30  TC(MIN.) =     16.34
  PEAK FLOW RATE(CFS)   =     18.01
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 600 EXISTING CONDITION                                           *
 **************************************************************************

  FILE NAME: SS06HE00.RAT
  TIME/DATE OF STUDY: 08:37 03/08/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   139.00
  UPSTREAM ELEVATION(FEET) =    492.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.627
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    58.78
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.381
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    610.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    491.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1710.00   CHANNEL SLOPE =  0.0123
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.686
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      40.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.05
  AVERAGE FLOW DEPTH(FEET) =   0.78   TRAVEL TIME(MIN.) =   7.04
  Tc(MIN.) =   17.67
  SUBAREA AREA(ACRES) =    71.10       SUBAREA RUNOFF(CFS) =   78.31
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
```

```
  TOTAL AREA(ACRES) =       71.4         PEAK FLOW RATE(CFS) =      78.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.05   FLOW VELOCITY(FEET/SEC.) =   4.83
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =    1849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    680.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    414.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   689.50   CHANNEL SLOPE =  0.0812
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.606
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      80.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.43
  AVERAGE FLOW DEPTH(FEET) =   0.62   TRAVEL TIME(MIN.) =   1.01
  Tc(MIN.) =   18.68
  SUBAREA AREA(ACRES) =     2.60       SUBAREA RUNOFF(CFS) =    2.78
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =       74.0         PEAK FLOW RATE(CFS) =      79.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =  11.33
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    680.00 =    2538.50 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       74.0  TC(MIN.) =     18.68
  PEAK FLOW RATE(CFS)   =      79.06
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                               San Diego, California 92110
                            619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                   *
* 100-YEAR, 6-HOUR STORM EVENT                                          *
* BASIN 700 EXISTING CONDITION                                          *
 *************************************************************************

  FILE NAME: SS07HE00.RAT
  TIME/DATE OF STUDY: 09:21 02/22/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
```

```
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   118.00
  UPSTREAM ELEVATION(FEET) =    492.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.491
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.90
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.396
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    710.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    491.00  DOWNSTREAM(FEET) =    467.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1368.00   CHANNEL SLOPE =  0.0175
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.792
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.89
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   5.86
  Tc(MIN.) =   16.36
  SUBAREA AREA(ACRES) =    35.90       SUBAREA RUNOFF(CFS) =   41.09
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =       36.0         PEAK FLOW RATE(CFS) =      41.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.72   FLOW VELOCITY(FEET/SEC.) =   4.67
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =    1486.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    780.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    467.00  DOWNSTREAM(FEET) =    439.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE =  0.1739
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.768
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.97
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   0.30
  Tc(MIN.) =   16.65
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.57
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =       36.5         PEAK FLOW RATE(CFS) =      41.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   9.04
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    780.00 =    1647.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       36.5  TC(MIN.) =     16.65
  PEAK FLOW RATE(CFS)   =      41.42
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 800 EXISTING CONDITION                                           *
 **************************************************************************

  FILE NAME: SS08HE00.RAT
  TIME/DATE OF STUDY: 14:38 02/22/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    801.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   106.00
  UPSTREAM ELEVATION(FEET) =    487.00
  DOWNSTREAM ELEVATION(FEET) =    486.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.422
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    67.74
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.404
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    810.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    486.00  DOWNSTREAM(FEET) =    476.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   411.00   CHANNEL SLOPE =  0.0243
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.069
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.26
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   3.04
  Tc(MIN.) =   13.46
  SUBAREA AREA(ACRES) =     3.20       SUBAREA RUNOFF(CFS) =    4.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
```

```
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =       4.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   2.77
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    810.00 =     517.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    810.00 TO NODE    880.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    476.00  DOWNSTREAM(FEET) =    456.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   155.00   CHANNEL SLOPE =  0.1290
  CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.978
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.11
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.83
  Tc(MIN.) =   14.29
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.49
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =        3.7         PEAK FLOW RATE(CFS) =       4.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   3.19
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    880.00 =     672.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.7  TC(MIN.) =     14.29
  PEAK FLOW RATE(CFS)   =       4.52
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 800A EXISTING CONDITION                                          *
 **************************************************************************

  FILE NAME: SS08AE00.RAT
  TIME/DATE OF STUDY: 14:29 02/22/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    850.00 TO NODE    851.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   136.00
  UPSTREAM ELEVATION(FEET) =    487.00
  DOWNSTREAM ELEVATION(FEET) =    486.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.606
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    59.41
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.383
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    851.00 TO NODE    860.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    486.00  DOWNSTREAM(FEET) =    452.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   322.00   CHANNEL SLOPE =  0.1056
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.240
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.11
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   1.31
  Tc(MIN.) =   11.91
  SUBAREA AREA(ACRES) =     4.20       SUBAREA RUNOFF(CFS) =    5.58
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
```

```
  TOTAL AREA(ACRES) =        4.5         PEAK FLOW RATE(CFS) =       5.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   5.15
  LONGEST FLOWPATH FROM NODE    850.00 TO NODE    860.00 =     458.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.5  TC(MIN.) =     11.91
  PEAK FLOW RATE(CFS)   =       5.98
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 800B EXISTING CONDITION                                          *
 **************************************************************************

  FILE NAME: SS08BE00.RAT
  TIME/DATE OF STUDY: 15:00 02/22/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    850.00 TO NODE    852.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    69.00
  UPSTREAM ELEVATION(FEET) =    487.00
  DOWNSTREAM ELEVATION(FEET) =    486.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.117
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.618
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    852.00 TO NODE    865.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    486.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0218
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.279
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.88
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   2.44
  Tc(MIN.) =   11.56
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    2.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       2.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   2.33
```

```
  LONGEST FLOWPATH FROM NODE    850.00 TO NODE    865.00 =     344.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =         1.9  TC(MIN.) =     11.56
  PEAK FLOW RATE(CFS)   =       2.55
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 900 EXISTING CONDITION                                           *
 **************************************************************************

  FILE NAME: SS09HE00.RAT
  TIME/DATE OF STUDY: 14:48 02/22/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    900.00 TO NODE    901.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
  UPSTREAM ELEVATION(FEET) =    487.00
  DOWNSTREAM ELEVATION(FEET) =    486.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.368
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    70.15
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.410
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE    910.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    486.00  DOWNSTREAM(FEET) =    476.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   434.00   CHANNEL SLOPE =  0.0230
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.054
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.24
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.24
  Tc(MIN.) =   13.60
  SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    4.26
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
```

```
  TOTAL AREA(ACRES) =        3.5         PEAK FLOW RATE(CFS) =       4.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   2.79
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    910.00 =     533.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    910.00 TO NODE    910.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.054
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4100
  SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    3.00
  TOTAL AREA(ACRES) =        5.9   TOTAL RUNOFF(CFS) =       7.39
  TC(MIN.) =   13.60

****************************************************************************
  FLOW PROCESS FROM NODE    910.00 TO NODE    980.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    476.00  DOWNSTREAM(FEET) =    436.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   264.00   CHANNEL SLOPE =  0.1515
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.958
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  82
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.06
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.87
  Tc(MIN.) =   14.47
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    1.21
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
  TOTAL AREA(ACRES) =        6.9         PEAK FLOW RATE(CFS) =       8.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   5.01
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    980.00 =     797.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        6.9  TC(MIN.) =     14.47
  PEAK FLOW RATE(CFS)   =       8.37
============================================================================
```

==========

END OF RATIONAL METHOD ANALYSIS

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 1000 EXISTING CONDITION                                          *
 **************************************************************************

  FILE NAME: SS10HE00.RAT
  TIME/DATE OF STUDY: 09:05 02/13/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1001.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   112.00
  UPSTREAM ELEVATION(FEET) =    532.00
  DOWNSTREAM ELEVATION(FEET) =    524.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.430
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.128
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.37

******************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1010.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    524.00  DOWNSTREAM(FEET) =    510.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   572.00   CHANNEL SLOPE =  0.0245
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.539
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.08
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   3.10
  Tc(MIN.) =   9.53
  SUBAREA AREA(ACRES) =     6.90       SUBAREA RUNOFF(CFS) =   10.99
  TOTAL AREA(ACRES) =      7.10         PEAK FLOW RATE(CFS) =      11.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   3.73
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1010.00 =   684.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1020.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =    443.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   717.00   CHANNEL SLOPE =  0.0934
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.288
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.15
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   1.94
  Tc(MIN.) =  11.47
  SUBAREA AREA(ACRES) =     2.20       SUBAREA RUNOFF(CFS) =    3.26
  TOTAL AREA(ACRES) =      9.30         PEAK FLOW RATE(CFS) =      14.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   6.41
```

```
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =  1401.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.288
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   14.80
 TOTAL AREA(ACRES) =     19.30   TOTAL RUNOFF(CFS) =   29.41
 TC(MIN.) =  11.47

****************************************************************************
 FLOW PROCESS FROM NODE   1020.00 TO NODE   1080.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    443.00  DOWNSTREAM(FEET) =    408.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   662.00   CHANNEL SLOPE =  0.0529
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.080
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     34.54
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.85
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   1.89
 Tc(MIN.) =  13.36
 SUBAREA AREA(ACRES) =     7.40       SUBAREA RUNOFF(CFS) =   10.26
 TOTAL AREA(ACRES) =     26.70         PEAK FLOW RATE(CFS) =      39.67

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   6.09
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1080.00 =  2063.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1080.00 TO NODE   1080.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.080
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 SUBAREA AREA(ACRES) =   20.90   SUBAREA RUNOFF(CFS) =   28.97
 TOTAL AREA(ACRES) =     47.60   TOTAL RUNOFF(CFS) =   68.64
 TC(MIN.) =  13.36

****************************************************************************
 FLOW PROCESS FROM NODE   1080.00 TO NODE   1080.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.080
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 SUBAREA AREA(ACRES) =   12.00   SUBAREA RUNOFF(CFS) =   16.63
```

```
  TOTAL AREA(ACRES) =     59.60   TOTAL RUNOFF(CFS) =   85.28
  TC(MIN.) =  13.36
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     59.60  TC(MIN.) =     13.36
  PEAK FLOW RATE(CFS)   =     85.28
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                       2003,1985,1981 HYDROLOGY MANUAL
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           Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                     *
* 100-YEAR, 6-HOUR STORM EVENT                                            *
* BASIN 1100 EXISTING CONDITION                                           *
 **************************************************************************

  FILE NAME: SS11HE00.RAT
  TIME/DATE OF STUDY: 09:11 02/13/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1101.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   123.00
  UPSTREAM ELEVATION(FEET) =    531.00
  DOWNSTREAM ELEVATION(FEET) =    529.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.035
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.336
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.30

******************************************************************************
  FLOW PROCESS FROM NODE   1101.00 TO NODE   1110.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    529.00  DOWNSTREAM(FEET) =    512.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   612.00   CHANNEL SLOPE =  0.0278
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.003
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.37
  AVERAGE FLOW DEPTH(FEET) =   0.27   TRAVEL TIME(MIN.) =   3.02
  Tc(MIN.) =  14.06
  SUBAREA AREA(ACRES) =     9.90       SUBAREA RUNOFF(CFS) =   13.38
  TOTAL AREA(ACRES) =     10.10         PEAK FLOW RATE(CFS) =      13.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   4.11
  LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1110.00 =   735.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   1110.00 TO NODE   1120.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    512.00  DOWNSTREAM(FEET) =    426.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   527.00   CHANNEL SLOPE =  0.1632
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.885
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     15.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.75
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.13
  Tc(MIN.) =  15.19
  SUBAREA AREA(ACRES) =     2.20       SUBAREA RUNOFF(CFS) =    2.86
  TOTAL AREA(ACRES) =     12.30         PEAK FLOW RATE(CFS) =      16.54

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   7.90
  LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1120.00 =  1262.00 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE   1120.00 TO NODE   1120.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.885
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 SUBAREA AREA(ACRES) =    5.40   SUBAREA RUNOFF(CFS) =    7.01
 TOTAL AREA(ACRES) =     17.70   TOTAL RUNOFF(CFS) =   23.55
 TC(MIN.) =  15.19

**************************************************************************
 FLOW PROCESS FROM NODE   1120.00 TO NODE   1180.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    426.00  DOWNSTREAM(FEET) =    392.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   433.00   CHANNEL SLOPE =  0.0785
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.808
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     26.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.51
 AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   0.96
 Tc(MIN.) =  16.15
 SUBAREA AREA(ACRES) =     3.90       SUBAREA RUNOFF(CFS) =    4.93
 TOTAL AREA(ACRES) =     21.60         PEAK FLOW RATE(CFS) =      28.47

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   7.83
 LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1180.00 =  1695.00 FEET.
==========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     21.60  TC(MIN.) =     16.15
 PEAK FLOW RATE(CFS)   =     28.47
==========================================================================
==========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
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           Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 1200 EXISTING CONDITION                                          *
 **************************************************************************

  FILE NAME: SS12HE00.RAT
  TIME/DATE OF STUDY: 09:16 02/13/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE   1200.00 TO NODE   1201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   118.00
  UPSTREAM ELEVATION(FEET) =    522.00
  DOWNSTREAM ELEVATION(FEET) =    521.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =   16.921
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.746
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.12

******************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE   1210.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    521.50  DOWNSTREAM(FEET) =    482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   840.00   CHANNEL SLOPE =  0.0470
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.494
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.41
  AVERAGE FLOW DEPTH(FEET) =   0.27   TRAVEL TIME(MIN.) =   3.17
  Tc(MIN.) =  20.09
  SUBAREA AREA(ACRES) =    16.10       SUBAREA RUNOFF(CFS) =   18.07
  TOTAL AREA(ACRES) =     16.20         PEAK FLOW RATE(CFS) =      18.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   5.35
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1210.00 =   958.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1280.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    482.00  DOWNSTREAM(FEET) =    354.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   829.00   CHANNEL SLOPE =  0.1544
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.398
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     21.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.63
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   1.60
  Tc(MIN.) =  21.69
  SUBAREA AREA(ACRES) =     5.40       SUBAREA RUNOFF(CFS) =    5.83
  TOTAL AREA(ACRES) =     21.60         PEAK FLOW RATE(CFS) =      24.02

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   8.98
```

```
 LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1280.00 =  1787.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     21.60  TC(MIN.) =     21.69
 PEAK FLOW RATE(CFS)   =     24.02
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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                       2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 1300 EXISTING CONDITION                                          *
 **************************************************************************

  FILE NAME: SS13HE00.RAT
  TIME/DATE OF STUDY: 09:22 02/13/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE   1300.00 TO NODE   1301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   109.00
  UPSTREAM ELEVATION(FEET) =    526.00
  DOWNSTREAM ELEVATION(FEET) =    523.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.717
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.694
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.17

******************************************************************************
  FLOW PROCESS FROM NODE   1301.00 TO NODE   1310.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    523.00  DOWNSTREAM(FEET) =    472.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1350.00   CHANNEL SLOPE =  0.0378
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.944
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.82
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   5.89
  Tc(MIN.) =  14.60
  SUBAREA AREA(ACRES) =    10.80       SUBAREA RUNOFF(CFS) =   14.31
  TOTAL AREA(ACRES) =     10.90         PEAK FLOW RATE(CFS) =      14.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   4.65
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1310.00 =  1459.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   1310.00 TO NODE   1310.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.944
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  87
  SUBAREA AREA(ACRES) =    2.80   SUBAREA RUNOFF(CFS) =    3.71
  TOTAL AREA(ACRES) =     13.70   TOTAL RUNOFF(CFS) =   18.18
  TC(MIN.) =  14.60

******************************************************************************
  FLOW PROCESS FROM NODE   1310.00 TO NODE   1380.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =    382.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   467.00   CHANNEL SLOPE =  0.1927
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.862
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  87
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     19.60
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.92
 AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   0.87
 Tc(MIN.) =  15.47
 SUBAREA AREA(ACRES) =     2.20       SUBAREA RUNOFF(CFS) =    2.83
 TOTAL AREA(ACRES) =     15.90         PEAK FLOW RATE(CFS) =      21.02

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   9.22
 LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1380.00 =  1926.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     15.90  TC(MIN.) =     15.47
 PEAK FLOW RATE(CFS)   =     21.02
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                          619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTHWEST VILLAGE                                             *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 1400 - BEYER BLVD PRE-PROJECT                                    *
 **************************************************************************

  FILE NAME: S1014E00.RAT
  TIME/DATE OF STUDY: 12:46 02/17/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1400.00 TO NODE   1401.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE   1401.00 TO NODE   1402.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  100.00  DOWNSTREAM ELEVATION(FEET) =   83.00
  STREET LENGTH(FEET) =   850.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   15.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.44
  STREET FLOW TRAVEL TIME(MIN.) =   4.15   Tc(MIN.) =    9.15
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.611
  *USER SPECIFIED(SUBAREA):
```

```
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
  SUBAREA AREA(ACRES) =   13.10      SUBAREA RUNOFF(CFS) =   33.11
  TOTAL AREA(ACRES) =       13.4        PEAK FLOW RATE(CFS) =      33.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  20.52
  FLOW VELOCITY(FEET/SEC.) =  4.03   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  850.0 FT WITH ELEVATION-DROP =  17.0 FT, IS   39.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1402.00
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1402.00 =     850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1402.00 TO NODE   1404.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     43.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   950.00   CHANNEL SLOPE =  0.0600
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.275
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      47.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.49
  AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   2.44
  Tc(MIN.) =   11.59
  SUBAREA AREA(ACRES) =    17.30       SUBAREA RUNOFF(CFS) =   27.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.576
  TOTAL AREA(ACRES) =       30.7         PEAK FLOW RATE(CFS) =      57.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.66   FLOW VELOCITY(FEET/SEC.) =   6.93
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1404.00 =    1800.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1404.00 TO NODE   1404.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.275
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6085
```

```
  SUBAREA AREA(ACRES) =    5.20   SUBAREA RUNOFF(CFS) =   13.62
  TOTAL AREA(ACRES) =       35.9   TOTAL RUNOFF(CFS) =      71.54
  TC(MIN.) =   11.59

****************************************************************************
  FLOW PROCESS FROM NODE   1404.00 TO NODE   1405.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     43.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1415.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.896
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      87.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.82
  AVERAGE FLOW DEPTH(FEET) =   0.93   TRAVEL TIME(MIN.) =   3.46
  Tc(MIN.) =   15.05
  SUBAREA AREA(ACRES) =    24.40       SUBAREA RUNOFF(CFS) =   31.80
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.544
  TOTAL AREA(ACRES) =       60.3         PEAK FLOW RATE(CFS) =      95.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.97   FLOW VELOCITY(FEET/SEC.) =   7.03
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1405.00 =    3215.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1405.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.05
  RAINFALL INTENSITY(INCH/HR) =   2.90
  TOTAL STREAM AREA(ACRES) =    60.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     95.06

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    100.00
  DOWNSTREAM ELEVATION(FEET) =     98.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.562
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.723
  SUBAREA RUNOFF(CFS) =      0.50
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.50

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     76.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.203
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.71
  AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   3.69
  Tc(MIN.) =   12.25
  SUBAREA AREA(ACRES) =     6.00       SUBAREA RUNOFF(CFS) =    8.65
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        6.3         PEAK FLOW RATE(CFS) =       9.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   3.28
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =     700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     92.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.091
```

```
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.28
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   1.02
  Tc(MIN.) =   13.27
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    0.97
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        7.0         PEAK FLOW RATE(CFS) =       9.74

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   3.33
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.091
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =    3.50   SUBAREA RUNOFF(CFS) =    4.87
  TOTAL AREA(ACRES) =       10.5   TOTAL RUNOFF(CFS) =      14.60
  TC(MIN.) =   13.27

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    199.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     80.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.878
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.15
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   2.01
  Tc(MIN.) =   15.27
  SUBAREA AREA(ACRES) =     6.70       SUBAREA RUNOFF(CFS) =    8.68
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =       17.2         PEAK FLOW RATE(CFS) =      22.28
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   4.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    199.00 =    1400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE   1405.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     72.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.691
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      32.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.99
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   2.34
  Tc(MIN.) =   17.61
  SUBAREA AREA(ACRES) =    17.00       SUBAREA RUNOFF(CFS) =   20.59
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =       34.2         PEAK FLOW RATE(CFS) =      41.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   5.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE   1405.00 =    2100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1405.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.61
  RAINFALL INTENSITY(INCH/HR) =   2.69
  TOTAL STREAM AREA(ACRES) =    34.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.42

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       95.06    15.05        2.896         60.30
      2       41.42    17.61        2.691         34.20
```

```
  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      130.46    15.05       2.896
      2      129.77    17.61       2.691

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     130.46   Tc(MIN.) =   15.05
  TOTAL AREA(ACRES) =       94.5
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1405.00 =    3215.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1410.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     84.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.827
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     133.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.77
  AVERAGE FLOW DEPTH(FEET) =   1.17   TRAVEL TIME(MIN.) =   0.86
  Tc(MIN.) =   15.91
  SUBAREA AREA(ACRES) =     5.10       SUBAREA RUNOFF(CFS) =    6.49
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.507
  TOTAL AREA(ACRES) =       99.6         PEAK FLOW RATE(CFS) =     142.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.22   FLOW VELOCITY(FEET/SEC.) =   7.90
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1410.00 =    3615.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1410.00 TO NODE   1410.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
================================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    100.00
  DOWNSTREAM ELEVATION(FEET) =     98.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.562
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.723
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     52.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   800.00   CHANNEL SLOPE =  0.0600
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.187
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.48
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   3.83
  Tc(MIN.) =   12.39
  SUBAREA AREA(ACRES) =     9.20       SUBAREA RUNOFF(CFS) =   13.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        9.4         PEAK FLOW RATE(CFS) =      13.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.37   FLOW VELOCITY(FEET/SEC.) =   4.20
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     88.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.039
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.73
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   1.34
  Tc(MIN.) =   13.73
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    0.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =       10.1         PEAK FLOW RATE(CFS) =      13.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   3.76
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =    1200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.039
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   26.30   SUBAREA RUNOFF(CFS) =   35.97
  TOTAL AREA(ACRES) =       36.4   TOTAL RUNOFF(CFS) =      49.78
  TC(MIN.) =   13.73

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    230.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     86.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.930
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      53.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.88
  AVERAGE FLOW DEPTH(FEET) =   0.71   TRAVEL TIME(MIN.) =   0.99
```

```
  Tc(MIN.) =   14.73
  SUBAREA AREA(ACRES) =     5.30       SUBAREA RUNOFF(CFS) =    6.99
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =       41.7         PEAK FLOW RATE(CFS) =      54.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.72   FLOW VELOCITY(FEET/SEC.) =   5.93
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =    1550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.930
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =   14.70   SUBAREA RUNOFF(CFS) =   19.38
  TOTAL AREA(ACRES) =       56.4   TOTAL RUNOFF(CFS) =      74.36
  TC(MIN.) =   14.73

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    299.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     82.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   450.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.830
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      77.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.57
  AVERAGE FLOW DEPTH(FEET) =   0.87   TRAVEL TIME(MIN.) =   1.14
  Tc(MIN.) =   15.87
  SUBAREA AREA(ACRES) =     4.60       SUBAREA RUNOFF(CFS) =    5.86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =       61.0         PEAK FLOW RATE(CFS) =      77.70

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.87   FLOW VELOCITY(FEET/SEC.) =   6.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    299.00 =    2000.00 FEET.

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

```
 FLOW PROCESS FROM NODE    299.00 TO NODE   1408.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     82.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   450.00   CHANNEL SLOPE =  0.0400
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.741
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      81.52
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.70
 AVERAGE FLOW DEPTH(FEET) =   0.90   TRAVEL TIME(MIN.) =   1.12
 Tc(MIN.) =   16.99
 SUBAREA AREA(ACRES) =     6.20       SUBAREA RUNOFF(CFS) =    7.65
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
 TOTAL AREA(ACRES) =       67.2         PEAK FLOW RATE(CFS) =      82.89

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.91   FLOW VELOCITY(FEET/SEC.) =   6.72
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE   1408.00 =    2450.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1408.00 TO NODE   1408.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   16.99
 RAINFALL INTENSITY(INCH/HR) =   2.74
 TOTAL STREAM AREA(ACRES) =    67.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     82.89

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    100.00
 DOWNSTREAM ELEVATION(FEET) =     98.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.562
```

```
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.723
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     76.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.230
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.91
  AVERAGE FLOW DEPTH(FEET) =   0.27   TRAVEL TIME(MIN.) =   3.44
  Tc(MIN.) =   12.00
  SUBAREA AREA(ACRES) =     7.90       SUBAREA RUNOFF(CFS) =   11.48
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        8.1         PEAK FLOW RATE(CFS) =      11.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   3.54
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =     700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     86.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.052
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.62
```

```
 AVERAGE FLOW DEPTH(FEET) =   0.31   TRAVEL TIME(MIN.) =   1.61
 Tc(MIN.) =   13.62
 SUBAREA AREA(ACRES) =     1.20       SUBAREA RUNOFF(CFS) =    1.65
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
 TOTAL AREA(ACRES) =        9.3         PEAK FLOW RATE(CFS) =      12.77

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   3.67
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =    1050.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.052
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
 SUBAREA AREA(ACRES) =    9.90   SUBAREA RUNOFF(CFS) =   13.60
 TOTAL AREA(ACRES) =       19.2   TOTAL RUNOFF(CFS) =      26.37
 TC(MIN.) =   13.62

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    399.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     84.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.0400
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      30.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.91
 AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   1.36
 Tc(MIN.) =   14.97
 SUBAREA AREA(ACRES) =     7.00       SUBAREA RUNOFF(CFS) =    9.14
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
 TOTAL AREA(ACRES) =       26.2         PEAK FLOW RATE(CFS) =      34.22

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   5.08
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    399.00 =    1450.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    399.00 TO NODE    399.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    1.83
  TOTAL AREA(ACRES) =       27.6   TOTAL RUNOFF(CFS) =      36.05
  TC(MIN.) =   14.97

****************************************************************************
  FLOW PROCESS FROM NODE    399.00 TO NODE   1408.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     90.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.838
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.20
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   0.80
  Tc(MIN.) =   15.78
  SUBAREA AREA(ACRES) =     2.10       SUBAREA RUNOFF(CFS) =    2.68
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =       29.7         PEAK FLOW RATE(CFS) =      37.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   5.26
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE   1408.00 =    1700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1408.00 TO NODE   1408.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.78
  RAINFALL INTENSITY(INCH/HR) =   2.84
```

```
  TOTAL STREAM AREA(ACRES) =    29.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.93

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       82.89    16.99        2.741         67.20
      2       37.93    15.78        2.838         29.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      114.90    15.78       2.838
      2      119.52    16.99       2.741

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     119.52   Tc(MIN.) =   16.99
  TOTAL AREA(ACRES) =       96.9
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE   1408.00 =    2450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1408.00 TO NODE   1410.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     78.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   550.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.644
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     123.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.58
  AVERAGE FLOW DEPTH(FEET) =   1.12   TRAVEL TIME(MIN.) =   1.21
  Tc(MIN.) =   18.20
  SUBAREA AREA(ACRES) =     6.90       SUBAREA RUNOFF(CFS) =    8.21
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =      103.8         PEAK FLOW RATE(CFS) =     123.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.12   FLOW VELOCITY(FEET/SEC.) =   7.58
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE   1410.00 =    3000.00 FEET.

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

```
  FLOW PROCESS FROM NODE   1410.00 TO NODE   1410.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      123.51    18.20       2.644      103.80
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE   1410.00 =    3000.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      142.81    15.91       2.827       99.60
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1410.00 =    3615.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     250.78      15.91        2.827
      2     257.07      18.20        2.644

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     257.07   Tc(MIN.) =   18.20
  TOTAL AREA(ACRES) =      203.4

****************************************************************************
  FLOW PROCESS FROM NODE   1410.00 TO NODE   1420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     60.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.504
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     271.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.52
  AVERAGE FLOW DEPTH(FEET) =   1.70   TRAVEL TIME(MIN.) =   1.75
  Tc(MIN.) =   19.95
  SUBAREA AREA(ACRES) =    25.90       SUBAREA RUNOFF(CFS) =   29.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.475
  TOTAL AREA(ACRES) =      229.3         PEAK FLOW RATE(CFS) =     272.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  1.70   FLOW VELOCITY(FEET/SEC.) =   9.51
 LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1420.00 =    4615.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1420.00 TO NODE   1430.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =      0.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2500.00   CHANNEL SLOPE =  0.0400
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.252
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     318.60
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.96
 AVERAGE FLOW DEPTH(FEET) =   1.84   TRAVEL TIME(MIN.) =   4.18
 Tc(MIN.) =   24.13
 SUBAREA AREA(ACRES) =    90.60       SUBAREA RUNOFF(CFS) =   91.82
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.468
 TOTAL AREA(ACRES) =      319.9         PEAK FLOW RATE(CFS) =     337.04

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.89   FLOW VELOCITY(FEET/SEC.) =  10.12
 LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1430.00 =    7115.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1430.00 TO NODE   1499.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    92.50
 FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.77
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     337.04
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   24.22
 LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1499.00 =    7265.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      319.9  TC(MIN.) =     24.22
 PEAK FLOW RATE(CFS)   =     337.04
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

APPENDIX B

Modified Rational Method Output
[Post-project]

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                          619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTHWEST VILLAGE                                             *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 100 POST-PROJECT                                                 *
 **************************************************************************

  FILE NAME: S101HP00.RAT
  TIME/DATE OF STUDY: 14:52 07/02/2020
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    533.00
  DOWNSTREAM ELEVATION(FEET) =    532.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.206
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.601
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    532.00  DOWNSTREAM(FEET) =    504.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   629.00   CHANNEL SLOPE =  0.0445
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.214
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.56
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   2.94
  Tc(MIN.) =  12.15
  SUBAREA AREA(ACRES) =     6.70       SUBAREA RUNOFF(CFS) =    9.69
  TOTAL AREA(ACRES) =      6.80         PEAK FLOW RATE(CFS) =       9.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   4.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =   704.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    504.00  DOWNSTREAM(FEET) =    478.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   332.00   CHANNEL SLOPE =  0.0783
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.121
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     10.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.59
  AVERAGE FLOW DEPTH(FEET) =   0.34   TRAVEL TIME(MIN.) =   0.84
  Tc(MIN.) =  12.99
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    1.40
  TOTAL AREA(ACRES) =      7.80         PEAK FLOW RATE(CFS) =      11.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   6.67
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =  1036.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    478.00  DOWNSTREAM(FEET) =    472.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   145.00   CHANNEL SLOPE =  0.0414
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.069
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     11.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.08
  AVERAGE FLOW DEPTH(FEET) =   0.34   TRAVEL TIME(MIN.) =   0.48
  Tc(MIN.) =  13.46
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.69
  TOTAL AREA(ACRES) =      8.30         PEAK FLOW RATE(CFS) =      11.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   5.09
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =  1181.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.40
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.95
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =  13.79
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    170.00 =  1308.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.79
  RAINFALL INTENSITY(INCH/HR) =   3.03
  TOTAL STREAM AREA(ACRES) =     8.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.95

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    122.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    93.00
  UPSTREAM ELEVATION(FEET) =    503.00
  DOWNSTREAM ELEVATION(FEET) =    498.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.441
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.126
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    498.00  DOWNSTREAM(FEET) =    474.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    98.00   CHANNEL SLOPE =  0.2449
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.025   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.969
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.97
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   0.83
  Tc(MIN.) =   7.27
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.36
  TOTAL AREA(ACRES) =      0.30         PEAK FLOW RATE(CFS) =       0.54

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   2.65
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    125.00 =   191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    127.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =   468.00
  FLOW LENGTH(FEET) =   331.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.51
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.54
  PIPE TRAVEL TIME(MIN.) =   2.19    Tc(MIN.) =   9.46
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    127.00 =   522.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    127.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.552
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.64
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =    1.18
  TC(MIN.) =   9.46
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    127.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   468.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =    72.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.27
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.18
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   9.75
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    170.00 =   594.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.75
  RAINFALL INTENSITY(INCH/HR) =   3.50
  TOTAL STREAM AREA(ACRES) =     0.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.18

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    132.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    94.00
  UPSTREAM ELEVATION(FEET) =    492.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.564
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    135.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
```

```
==========================================================================
  UPSTREAM ELEVATION(FEET) =  491.00  DOWNSTREAM ELEVATION(FEET) =  489.50
  STREET LENGTH(FEET) =   341.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.71
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    5.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.20
  STREET FLOW TRAVEL TIME(MIN.) =   6.26   Tc(MIN.) =  12.26
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.202
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.61
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       1.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   6.55
  FLOW VELOCITY(FEET/SEC.) =  0.98   DEPTH*VELOCITY(FT*FT/SEC.) =   0.23
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    135.00 =   435.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.202
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    2.78
  TOTAL AREA(ACRES) =      1.40   TOTAL RUNOFF(CFS) =    3.79
  TC(MIN.) =  12.26

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   485.00  DOWNSTREAM(FEET) =   484.50
  FLOW LENGTH(FEET) =     3.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.94
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.79
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =  12.26
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    140.00 =   438.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.201
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    2.05
  TOTAL AREA(ACRES) =      2.20   TOTAL RUNOFF(CFS) =    5.84
  TC(MIN.) =  12.26

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.50  DOWNSTREAM(FEET) =   482.50
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.61
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.84
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =  12.61
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    150.00 =   578.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.163
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.47
  TOTAL AREA(ACRES) =      2.40   TOTAL RUNOFF(CFS) =    6.31
```

```
  TC(MIN.) =  12.61

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.163
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    3.49
  TOTAL AREA(ACRES) =      3.70   TOTAL RUNOFF(CFS) =    9.81
  TC(MIN.) =  12.61

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   482.50  DOWNSTREAM(FEET) =   482.00
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.07
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.81
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  12.67
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    160.00 =   608.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.156
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    2.02
  TOTAL AREA(ACRES) =      4.50   TOTAL RUNOFF(CFS) =   11.83
  TC(MIN.) =  12.67

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.156
  *USER SPECIFIED(SUBAREA):
```

```
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.39
  TOTAL AREA(ACRES) =      5.40   TOTAL RUNOFF(CFS) =   14.21
  TC(MIN.) =  12.67

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   482.00  DOWNSTREAM(FEET) =   467.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.27
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.21
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  12.79
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    170.00 =   733.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.79
  RAINFALL INTENSITY(INCH/HR) =   3.14
  TOTAL STREAM AREA(ACRES) =     5.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.21

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.95    13.79        3.033          8.30
      2        1.18     9.75        3.498          0.70
      3       14.21    12.79        3.143          5.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       24.31     9.75       3.498
      2       26.80    12.79       3.143
      3       26.69    13.79       3.033
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     26.80   Tc(MIN.) =   12.79
  TOTAL AREA(ACRES) =     14.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    170.00 =  1308.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.143
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.57
  TOTAL AREA(ACRES) =     14.80   TOTAL RUNOFF(CFS) =   27.37
  TC(MIN.) =  12.79

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.143
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.57
  TOTAL AREA(ACRES) =     15.20   TOTAL RUNOFF(CFS) =   27.93
  TC(MIN.) =  12.79

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    180.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   467.00  DOWNSTREAM(FEET) =   400.00
  FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  32.32
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.93
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  12.88
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    180.00 =  1480.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.133
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    1.13
  TOTAL AREA(ACRES) =     16.00   TOTAL RUNOFF(CFS) =   29.06
  TC(MIN.) =  12.88

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.133
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    0.71
  TOTAL AREA(ACRES) =     16.50   TOTAL RUNOFF(CFS) =   29.77
  TC(MIN.) =  12.88
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     16.50  TC(MIN.) =     12.88
  PEAK FLOW RATE(CFS)   =     29.77
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2003 Advanced Engineering Software (aes)
              Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
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 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTHWEST VILLAGE                                             *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 200 POST PROJECT, OFFSITE ULTIMATE COND.                         *
 **************************************************************************

  FILE NAME: S102HP00.RAT
  TIME/DATE OF STUDY: 14:39 07/02/2020
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180
  3   11.0      6.0    0.020/0.018/0.020   0.50    1.50 0.0313 0.125 0.0130

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    520.00
  DOWNSTREAM ELEVATION(FEET) =    519.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.971
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    204.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  519.50  DOWNSTREAM ELEVATION(FEET) =  486.00
  STREET LENGTH(FEET) =   704.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
```

```
    HALFSTREET FLOOD WIDTH(FEET) =    7.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.47
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.89
  STREET FLOW TRAVEL TIME(MIN.) =   3.38   Tc(MIN.) =   9.38
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.567
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.72
  TOTAL AREA(ACRES) =      1.30        PEAK FLOW RATE(CFS) =       4.12

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   9.78
  FLOW VELOCITY(FEET/SEC.) =  3.96   DEPTH*VELOCITY(FT*FT/SEC.) =   1.19
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =   789.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    230.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   483.00  DOWNSTREAM(FEET) =   481.00
  FLOW LENGTH(FEET) =   347.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.12
  PIPE TRAVEL TIME(MIN.) =   1.32    Tc(MIN.) =  10.70
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =  1136.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    510.00
  DOWNSTREAM ELEVATION(FEET) =    509.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.171
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.797
 SUBAREA RUNOFF(CFS) =      0.17
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =    496.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00   CHANNEL SLOPE =  0.1057
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.521
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.49
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.41
 AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.46
 Tc(MIN.) =   9.63
 SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.63
 TOTAL AREA(ACRES) =      0.50         PEAK FLOW RATE(CFS) =       0.80

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   1.87
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =   188.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    209.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  496.00  DOWNSTREAM ELEVATION(FEET) =  494.00
 STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 11.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.200
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.200

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.97
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    2.05
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
  STREET FLOW TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =  10.34
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.413
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =       1.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   2.15
  FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    209.00 =   311.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.413
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.27
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =    1.40
  TC(MIN.) =  10.34

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    209.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.413
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.55
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =    1.95
  TC(MIN.) =  10.34

****************************************************************************
  FLOW PROCESS FROM NODE    209.00 TO NODE    210.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   491.00  DOWNSTREAM(FEET) =   490.50
```

```
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.94
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.95
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =  10.62
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    210.00 =   378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.381
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.44
  TOTAL AREA(ACRES) =      1.40   TOTAL RUNOFF(CFS) =    3.39
  TC(MIN.) =  10.62

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    212.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.50  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.19
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.39
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =  11.54
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    212.00 =   553.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.281
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.10
  TOTAL AREA(ACRES) =      1.80   TOTAL RUNOFF(CFS) =    4.49
  TC(MIN.) =  11.54

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

```
 FLOW PROCESS FROM NODE    212.00 TO NODE    215.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   489.50
 FLOW LENGTH(FEET) =    23.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.32
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      4.49
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  11.59
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    215.00 =   576.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.275
 *USER SPECIFIED(SUBAREA):
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.84
 TOTAL AREA(ACRES) =      2.10   TOTAL RUNOFF(CFS) =    5.32
 TC(MIN.) =  11.59

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.275
 *USER SPECIFIED(SUBAREA):
 INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.31
 TOTAL AREA(ACRES) =      2.20   TOTAL RUNOFF(CFS) =    5.63
 TC(MIN.) =  11.59

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    217.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   489.50  DOWNSTREAM(FEET) =   488.00
 FLOW LENGTH(FEET) =   159.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.64
```

```
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.63
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =  12.06
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    217.00 =   735.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.224
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    2.22
  TOTAL AREA(ACRES) =      3.00   TOTAL RUNOFF(CFS) =    7.85
  TC(MIN.) =  12.06

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    228.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.00  DOWNSTREAM(FEET) =   487.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.80
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.85
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  12.13
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    228.00 =   775.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    228.00 TO NODE    228.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.13
  RAINFALL INTENSITY(INCH/HR) =   3.22
  TOTAL STREAM AREA(ACRES) =     3.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.85

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    222.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    84.00
  UPSTREAM ELEVATION(FEET) =    498.00
  DOWNSTREAM ELEVATION(FEET) =    497.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.670
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
  FLOW PROCESS FROM NODE    222.00 TO NODE    223.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  497.00  DOWNSTREAM ELEVATION(FEET) =  496.00
  STREET LENGTH(FEET) =    99.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.51
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.37
  STREET FLOW TRAVEL TIME(MIN.) =   0.92   Tc(MIN.) =   6.92
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.036
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.36
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   5.23
  FLOW VELOCITY(FEET/SEC.) =  1.87   DEPTH*VELOCITY(FT*FT/SEC.) =   0.42
  LONGEST FLOWPATH FROM NODE    220.00 TO NODE    223.00 =   183.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    223.00 TO NODE    223.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.036
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.32
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =    1.01
  TC(MIN.) =   6.92

****************************************************************************
  FLOW PROCESS FROM NODE    223.00 TO NODE    225.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   492.00  DOWNSTREAM(FEET) =   490.00
  FLOW LENGTH(FEET) =   205.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.60
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.01
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =   7.87
  LONGEST FLOWPATH FROM NODE    220.00 TO NODE    225.00 =   388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    225.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.855
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.30
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =    2.31
  TC(MIN.) =   7.87

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    227.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   488.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.59
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.31
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   8.59
  LONGEST FLOWPATH FROM NODE    220.00 TO NODE    227.00 =   588.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    227.00 TO NODE    227.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.717
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.90
  TOTAL AREA(ACRES) =      1.30   TOTAL RUNOFF(CFS) =    4.21
  TC(MIN.) =   8.59

****************************************************************************
  FLOW PROCESS FROM NODE    227.00 TO NODE    228.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.00  DOWNSTREAM(FEET) =   487.00
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.44
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.21
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   9.23
  LONGEST FLOWPATH FROM NODE    220.00 TO NODE    228.00 =   758.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    228.00 TO NODE    228.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.23
  RAINFALL INTENSITY(INCH/HR) =   3.60
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.21

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.85    12.13        3.215          3.00
      2        4.21     9.23        3.596          1.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       11.23     9.23       3.596
      2       11.61    12.13       3.215

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     11.61   Tc(MIN.) =   12.13
  TOTAL AREA(ACRES) =      4.30
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    228.00 =   775.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    228.00 TO NODE    229.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   487.00  DOWNSTREAM(FEET) =   485.00
  FLOW LENGTH(FEET) =    63.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.69
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.61
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  12.23
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    229.00 =   838.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    229.00 TO NODE    229.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.204
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.30
  TOTAL AREA(ACRES) =      4.40   TOTAL RUNOFF(CFS) =   11.92
  TC(MIN.) =  12.23

****************************************************************************
  FLOW PROCESS FROM NODE    229.00 TO NODE    229.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.204
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.22
  TOTAL AREA(ACRES) =      4.80   TOTAL RUNOFF(CFS) =   13.13
  TC(MIN.) =  12.23

**************************************************************************
  FLOW PROCESS FROM NODE    229.00 TO NODE    230.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   485.00  DOWNSTREAM(FEET) =   481.00
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.87
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     13.13
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =  12.34
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    230.00 =   921.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  11
--------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       13.13    12.34        3.193        4.80
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    230.00 =   921.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1        4.12    10.70        3.373        1.30
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =  1136.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      16.56      10.70        3.373
      2      17.04      12.34        3.193

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     17.04   Tc(MIN.) =   12.34
```

```
  TOTAL AREA(ACRES) =      6.10

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    235.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   481.00  DOWNSTREAM(FEET) =   478.50
  FLOW LENGTH(FEET) =   480.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.42
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     17.04
  PIPE TRAVEL TIME(MIN.) =   1.48    Tc(MIN.) =  13.82
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    235.00 =  1616.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    235.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.030
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.73
  TOTAL AREA(ACRES) =      6.70   TOTAL RUNOFF(CFS) =   18.77
  TC(MIN.) =  13.82

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    235.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.030
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.59
  TOTAL AREA(ACRES) =      7.60   TOTAL RUNOFF(CFS) =   21.36
  TC(MIN.) =  13.82
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    268.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   478.50  DOWNSTREAM(FEET) =   478.00
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.14
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     21.36
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  13.88
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    268.00 =  1651.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    268.00 TO NODE    268.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    241.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    73.00
  UPSTREAM ELEVATION(FEET) =    494.00
  DOWNSTREAM ELEVATION(FEET) =    493.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.539
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    241.00 TO NODE    242.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    494.00  DOWNSTREAM(FEET) =    490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    90.00   CHANNEL SLOPE =  0.0444
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.968
```

```
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.18
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.27
  Tc(MIN.) =   7.27
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.28
  TOTAL AREA(ACRES) =      0.20         PEAK FLOW RATE(CFS) =       0.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    242.00 =   163.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    242.00 TO NODE    247.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  493.00  DOWNSTREAM ELEVATION(FEET) =  492.00
  STREET LENGTH(FEET) =    84.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.74
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    6.20
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.36
  STREET FLOW TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =   8.16
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.800
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =      0.30        PEAK FLOW RATE(CFS) =       0.91

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.24   HALFSTREET FLOOD WIDTH(FEET) =   6.85
  FLOW VELOCITY(FEET/SEC.) =  1.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.40
```

```
  LONGEST FLOWPATH FROM NODE    240.00 TO NODE    247.00 =   247.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    247.00 TO NODE    247.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.16
  RAINFALL INTENSITY(INCH/HR) =   3.80
  TOTAL STREAM AREA(ACRES) =     0.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.91

****************************************************************************
  FLOW PROCESS FROM NODE    243.00 TO NODE    245.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    492.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.249
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    246.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  491.00  DOWNSTREAM ELEVATION(FEET) =  490.00
  STREET LENGTH(FEET) =   118.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 11.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.36
  STREET FLOW TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =   7.17
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.988
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =      0.20        PEAK FLOW RATE(CFS) =       0.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.52
  FLOW VELOCITY(FEET/SEC.) =  1.79   DEPTH*VELOCITY(FT*FT/SEC.) =   0.41
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    246.00 =   193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    246.00 TO NODE    246.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.988
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.66
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =    2.37
  TC(MIN.) =   7.17

****************************************************************************
  FLOW PROCESS FROM NODE    246.00 TO NODE    247.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   487.00  DOWNSTREAM(FEET) =   486.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.11
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.37
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   7.74
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    247.00 =   333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    247.00 TO NODE    247.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.880
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    3.54
  TOTAL AREA(ACRES) =      1.80   TOTAL RUNOFF(CFS) =    5.91
  TC(MIN.) =   7.74

****************************************************************************
  FLOW PROCESS FROM NODE    247.00 TO NODE    247.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.74
  RAINFALL INTENSITY(INCH/HR) =   3.88
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.91

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.91     8.16        3.800          0.30
      2        5.91     7.74        3.880          1.80

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        6.81     7.74       3.880
      2        6.71     8.16       3.800

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      6.81   Tc(MIN.) =    7.74
  TOTAL AREA(ACRES) =      2.10
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    247.00 =   333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    247.00 TO NODE    249.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   486.00  DOWNSTREAM(FEET) =   484.00
  FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.81
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   8.56
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    249.00 =   603.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    249.00 TO NODE    249.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.723
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.85
  TOTAL AREA(ACRES) =      3.00   TOTAL RUNOFF(CFS) =    9.66
  TC(MIN.) =   8.56

****************************************************************************
  FLOW PROCESS FROM NODE    249.00 TO NODE    254.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.00  DOWNSTREAM(FEET) =   482.00
  FLOW LENGTH(FEET) =   239.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.23
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.66
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   9.20
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    254.00 =   842.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    254.00 TO NODE    254.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.20
  RAINFALL INTENSITY(INCH/HR) =   3.60
  TOTAL STREAM AREA(ACRES) =     3.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.66

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

```
 FLOW PROCESS FROM NODE    250.00 TO NODE    251.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    87.00
 UPSTREAM ELEVATION(FEET) =    490.00
 DOWNSTREAM ELEVATION(FEET) =    489.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.808
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.34
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
 FLOW PROCESS FROM NODE    251.00 TO NODE    252.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  489.00  DOWNSTREAM ELEVATION(FEET) =  488.50
 STREET LENGTH(FEET) =   213.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 11.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   6.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.98
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    8.70
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.14
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.34
 STREET FLOW TRAVEL TIME(MIN.) =   3.10   Tc(MIN.) =   9.10
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.620
 *USER SPECIFIED(SUBAREA):
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8800
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.27
 TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.61
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.77
  FLOW VELOCITY(FEET/SEC.) =  1.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.43
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    252.00 =   300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    252.00 TO NODE    252.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.620
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.38
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =    2.99
  TC(MIN.) =   9.10

****************************************************************************
  FLOW PROCESS FROM NODE    252.00 TO NODE    253.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   488.50  DOWNSTREAM(FEET) =   485.00
  FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.08
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.99
  PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =  10.09
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    253.00 =   600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    253.00 TO NODE    253.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.440
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .7400
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.29
  TOTAL AREA(ACRES) =      1.80   TOTAL RUNOFF(CFS) =    5.28
  TC(MIN.) =  10.09

****************************************************************************
  FLOW PROCESS FROM NODE    253.00 TO NODE    254.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   485.00  DOWNSTREAM(FEET) =   482.00
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.94
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.28
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  10.14
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    254.00 =   637.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    254.00 TO NODE    254.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.14
  RAINFALL INTENSITY(INCH/HR) =   3.43
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.28

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.66     9.20        3.602          3.00
      2        5.28    10.14        3.435          1.80

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.69     9.20       3.602
      2       14.49    10.14       3.435

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     14.69   Tc(MIN.) =    9.20
  TOTAL AREA(ACRES) =      4.80
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    254.00 =   842.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    254.00 TO NODE    255.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   482.00  DOWNSTREAM(FEET) =   481.50
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.10
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.69
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   9.33
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    255.00 =   897.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    255.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.577
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.68
  TOTAL AREA(ACRES) =      5.00   TOTAL RUNOFF(CFS) =   15.37
  TC(MIN.) =   9.33

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   481.50  DOWNSTREAM(FEET) =   481.25
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.18
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     15.37
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   9.35
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    260.00 =   908.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    260.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.35
  RAINFALL INTENSITY(INCH/HR) =   3.57
  TOTAL STREAM AREA(ACRES) =     5.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.37

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

```
 FLOW PROCESS FROM NODE    256.00 TO NODE    257.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8800
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
 UPSTREAM ELEVATION(FEET) =    491.00
 DOWNSTREAM ELEVATION(FEET) =    490.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.458
 TIME OF CONCENTRATION ASSUMED AS 6-MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
 SUBAREA RUNOFF(CFS) =      0.74
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.74

****************************************************************************
 FLOW PROCESS FROM NODE    257.00 TO NODE    258.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   487.00  DOWNSTREAM(FEET) =   485.00
 FLOW LENGTH(FEET) =   288.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.91
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.74
 PIPE TRAVEL TIME(MIN.) =   1.65    Tc(MIN.) =   7.65
 LONGEST FLOWPATH FROM NODE    256.00 TO NODE    258.00 =   373.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    258.00 TO NODE    258.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.897
 *USER SPECIFIED(SUBAREA):
 MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8400
 S.C.S. CURVE NUMBER (AMC II) =   0
 SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    2.62
 TOTAL AREA(ACRES) =      1.00   TOTAL RUNOFF(CFS) =    3.36
 TC(MIN.) =   7.65

****************************************************************************
 FLOW PROCESS FROM NODE    258.00 TO NODE    259.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   485.00  DOWNSTREAM(FEET) =   484.50
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.55
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.36
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   7.71
  LONGEST FLOWPATH FROM NODE    256.00 TO NODE    259.00 =   398.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    259.00 TO NODE    259.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.885
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =      1.30   TOTAL RUNOFF(CFS) =    4.35
  TC(MIN.) =   7.71

****************************************************************************
  FLOW PROCESS FROM NODE    259.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.50  DOWNSTREAM(FEET) =   481.25
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.32
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      4.35
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   7.90
  LONGEST FLOWPATH FROM NODE    256.00 TO NODE    260.00 =   493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    260.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.90
  RAINFALL INTENSITY(INCH/HR) =   3.85
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.35
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       15.37     9.35        3.574          5.00
      2        4.35     7.90        3.849          1.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       18.62     7.90       3.849
      2       19.41     9.35       3.574

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     19.41   Tc(MIN.) =    9.35
  TOTAL AREA(ACRES) =      6.30
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    260.00 =   908.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    261.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   481.25  DOWNSTREAM(FEET) =   481.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.18
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.41
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   9.47
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    261.00 =   953.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    261.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.551
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =      6.40   TOTAL RUNOFF(CFS) =   19.75
  TC(MIN.) =   9.47
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    261.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.551
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =      6.50   TOTAL RUNOFF(CFS) =   20.08
  TC(MIN.) =   9.47

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    265.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   481.00  DOWNSTREAM(FEET) =   479.00
  FLOW LENGTH(FEET) =   203.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  15.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.95
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.08
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   9.90
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    265.00 =  1156.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    265.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.470
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    3.63
  TOTAL AREA(ACRES) =      7.60   TOTAL RUNOFF(CFS) =   23.71
  TC(MIN.) =   9.90

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    268.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   479.00  DOWNSTREAM(FEET) =   478.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.8 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.47
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.71
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  10.02
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    268.00 =  1226.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    268.00 TO NODE    268.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       23.71    10.02        3.448        7.60
  LONGEST FLOWPATH FROM NODE    243.00 TO NODE    268.00 =  1226.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       21.36    13.88        3.023        7.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    268.00 =  1651.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      42.44      10.02        3.448
      2      42.15      13.88        3.023

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     42.44   Tc(MIN.) =   10.02
  TOTAL AREA(ACRES) =     15.20

****************************************************************************
  FLOW PROCESS FROM NODE    268.00 TO NODE    268.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    268.00 TO NODE    269.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   478.00  DOWNSTREAM(FEET) =   475.00
  FLOW LENGTH(FEET) =   474.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.99
```

```
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     42.44
  PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =  11.01
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    269.00 =  2125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    269.00 TO NODE    269.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.339
  *USER SPECIFIED(SUBAREA):
  INDUSTRIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    3.17
  TOTAL AREA(ACRES) =     16.20   TOTAL RUNOFF(CFS) =   45.61
  TC(MIN.) =  11.01

****************************************************************************
  FLOW PROCESS FROM NODE    269.00 TO NODE    287.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   475.00  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   310.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.72
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     45.61
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  11.45
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    287.00 =  2435.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    271.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    96.00
  UPSTREAM ELEVATION(FEET) =    496.00
  DOWNSTREAM ELEVATION(FEET) =    495.00
```

```
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.393
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    271.00 TO NODE    272.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  495.00  DOWNSTREAM ELEVATION(FEET) =  490.00
  STREET LENGTH(FEET) =   134.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.17
    HALFSTREET FLOOD WIDTH(FEET) =    3.06
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.38
  STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   6.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.026
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =       1.32

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =   4.32
  FLOW VELOCITY(FEET/SEC.) =  2.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.46
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    272.00 =   230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    272.00 TO NODE    272.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.026
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7300
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.18
TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS) =    2.50
TC(MIN.) =   6.97

****************************************************************************
FLOW PROCESS FROM NODE    272.00 TO NODE    273.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   487.00  DOWNSTREAM(FEET) =   485.00
FLOW LENGTH(FEET) =   257.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.29
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      2.50
PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   7.97
LONGEST FLOWPATH FROM NODE    270.00 TO NODE    273.00 =   487.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    273.00 TO NODE    273.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.836
*USER SPECIFIED(SUBAREA):
SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .6100
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.11
TOTAL AREA(ACRES) =      1.70   TOTAL RUNOFF(CFS) =    4.60
TC(MIN.) =   7.97

****************************************************************************
FLOW PROCESS FROM NODE    273.00 TO NODE    274.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   485.00  DOWNSTREAM(FEET) =   484.00
FLOW LENGTH(FEET) =   177.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.43
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      4.60
PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   8.63
LONGEST FLOWPATH FROM NODE    270.00 TO NODE    274.00 =   664.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    274.00 TO NODE    274.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.710
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.67
  TOTAL AREA(ACRES) =      2.60   TOTAL RUNOFF(CFS) =    7.28
  TC(MIN.) =   8.63

****************************************************************************
  FLOW PROCESS FROM NODE    274.00 TO NODE    275.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.00  DOWNSTREAM(FEET) =   483.00
  FLOW LENGTH(FEET) =   141.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.28
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   9.06
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    275.00 =   805.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    275.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.628
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.78
  TOTAL AREA(ACRES) =      3.20   TOTAL RUNOFF(CFS) =    9.06
  TC(MIN.) =   9.06

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    280.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   483.00  DOWNSTREAM(FEET) =   482.00
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.22
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.06
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   9.24
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    280.00 =   882.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.594
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.58
  TOTAL AREA(ACRES) =      3.40   TOTAL RUNOFF(CFS) =    9.64
  TC(MIN.) =   9.24

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.24
  RAINFALL INTENSITY(INCH/HR) =   3.59
  TOTAL STREAM AREA(ACRES) =     3.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.64

****************************************************************************
  FLOW PROCESS FROM NODE    276.00 TO NODE    277.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    98.00
  UPSTREAM ELEVATION(FEET) =    492.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.487
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.33
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    277.00 TO NODE    278.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  491.00  DOWNSTREAM ELEVATION(FEET) =  489.00
  STREET LENGTH(FEET) =   169.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    4.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.29
  STREET FLOW TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =   7.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.836
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8100
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.24
  TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =       1.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   6.38
  FLOW VELOCITY(FEET/SEC.) =  1.60   DEPTH*VELOCITY(FT*FT/SEC.) =   0.37
  LONGEST FLOWPATH FROM NODE    276.00 TO NODE    278.00 =   267.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    278.00 TO NODE    278.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.836
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.52
  TOTAL AREA(ACRES) =      1.00   TOTAL RUNOFF(CFS) =    3.09
  TC(MIN.) =   7.97
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    278.00 TO NODE    280.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   485.00  DOWNSTREAM(FEET) =   482.00
  FLOW LENGTH(FEET) =   248.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.20
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.09
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   8.76
  LONGEST FLOWPATH FROM NODE    276.00 TO NODE    280.00 =   515.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.685
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    2.36
  TOTAL AREA(ACRES) =      1.80   TOTAL RUNOFF(CFS) =    5.45
  TC(MIN.) =   8.76

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.76
  RAINFALL INTENSITY(INCH/HR) =   3.69
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.45

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.64     9.24        3.594          3.40
      2        5.45     8.76        3.685          1.80

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
```

```
  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.85     8.76       3.685
      2       14.95     9.24       3.594

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     14.95   Tc(MIN.) =    9.24
  TOTAL AREA(ACRES) =      5.20
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    280.00 =   882.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    281.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   482.00  DOWNSTREAM(FEET) =   481.00
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.98
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.95
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   9.29
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    281.00 =   916.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    281.00 TO NODE    281.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.584
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.70
  TOTAL AREA(ACRES) =      5.80   TOTAL RUNOFF(CFS) =   16.65
  TC(MIN.) =   9.29

****************************************************************************
  FLOW PROCESS FROM NODE    281.00 TO NODE    281.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.584
  *USER SPECIFIED(SUBAREA):
  SINGLE FAMILY DEVELOPMENT RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.58
```

```
  TOTAL AREA(ACRES) =      6.70   TOTAL RUNOFF(CFS) =   19.23
  TC(MIN.) =   9.29

****************************************************************************
  FLOW PROCESS FROM NODE    281.00 TO NODE    287.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   481.00  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   137.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.58
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.23
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   9.43
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    287.00 =  1053.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.558
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    0.80
  TOTAL AREA(ACRES) =      7.20   TOTAL RUNOFF(CFS) =   20.03
  TC(MIN.) =   9.43

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.558
  *USER SPECIFIED(SUBAREA):
  RURAL DEVELOPMENT RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    0.80
  TOTAL AREA(ACRES) =      7.70   TOTAL RUNOFF(CFS) =   20.83
  TC(MIN.) =   9.43

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       20.83     9.43       3.558        7.70
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    287.00 =  1053.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
      1       45.61    11.45       3.291       16.20
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    287.00 =  2435.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      63.01       9.43        3.558
      2      64.87      11.45        3.291

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     64.87   Tc(MIN.) =   11.45
  TOTAL AREA(ACRES) =     23.90

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.45
  RAINFALL INTENSITY(INCH/HR) =   3.29
  TOTAL STREAM AREA(ACRES) =    23.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     64.87

****************************************************************************
  FLOW PROCESS FROM NODE    282.00 TO NODE    283.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    74.00
  UPSTREAM ELEVATION(FEET) =    492.00
```

```
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.501
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE    283.00 TO NODE    284.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    491.00  DOWNSTREAM(FEET) =    485.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1195.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.249
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     17.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.42
  AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   5.82
  Tc(MIN.) =  11.82
  SUBAREA AREA(ACRES) =    12.30       SUBAREA RUNOFF(CFS) =   33.97
  TOTAL AREA(ACRES) =     12.40         PEAK FLOW RATE(CFS) =      34.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   4.10
  LONGEST FLOWPATH FROM NODE    282.00 TO NODE    284.00 =  1269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    284.00 TO NODE    284.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.249
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    7.20   SUBAREA RUNOFF(CFS) =   19.89
  TOTAL AREA(ACRES) =     19.60   TOTAL RUNOFF(CFS) =   54.22
  TC(MIN.) =  11.82

****************************************************************************
  FLOW PROCESS FROM NODE    284.00 TO NODE    285.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    485.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   671.00   CHANNEL SLOPE =  0.0075
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.081
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     64.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.32
  AVERAGE FLOW DEPTH(FEET) =   1.28   TRAVEL TIME(MIN.) =   1.53
  Tc(MIN.) =  13.35
  SUBAREA AREA(ACRES) =     7.50       SUBAREA RUNOFF(CFS) =   19.64
  TOTAL AREA(ACRES) =     27.10         PEAK FLOW RATE(CFS) =      73.86

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.37   FLOW VELOCITY(FEET/SEC.) =   7.58
  LONGEST FLOWPATH FROM NODE    282.00 TO NODE    285.00 =  1940.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    285.00 TO NODE    285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.081
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    9.70   SUBAREA RUNOFF(CFS) =   25.41
  TOTAL AREA(ACRES) =     36.80   TOTAL RUNOFF(CFS) =   99.27
  TC(MIN.) =  13.35

****************************************************************************
  FLOW PROCESS FROM NODE    285.00 TO NODE    287.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   470.00
  FLOW LENGTH(FEET) =   590.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.32
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     99.27
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =  14.30
  LONGEST FLOWPATH FROM NODE    282.00 TO NODE    287.00 =  2530.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    287.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.30
  RAINFALL INTENSITY(INCH/HR) =   2.98
  TOTAL STREAM AREA(ACRES) =    36.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.27

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       64.87    11.45        3.291         23.90
      2       99.27    14.30        2.977         36.80

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      154.67    11.45       3.291
      2      157.95    14.30       2.977

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    157.95   Tc(MIN.) =   14.30
  TOTAL AREA(ACRES) =     60.70
  LONGEST FLOWPATH FROM NODE    282.00 TO NODE    287.00 =  2530.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    290.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =   390.00
  FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  55.94
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    157.95
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  14.35
  LONGEST FLOWPATH FROM NODE    282.00 TO NODE    290.00 =  2690.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     60.70  TC(MIN.) =     14.35
```

```
  PEAK FLOW RATE(CFS)   =    157.95
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

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                           San Diego, California 92110
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 ************************ DESCRIPTION OF STUDY *************************
* J-15013C SOUTHWEST VILLAGE                                           *
* 100-YEAR, 6-HOUR STORM EVENT                                         *
* BASIN 300 POST-PROJECT                                               *
 **********************************************************************

  FILE NAME: S103HP00.RAT
  TIME/DATE OF STUDY: 15:08 02/15/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    304.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  100.00  DOWNSTREAM ELEVATION(FEET) =   96.14
  STREET LENGTH(FEET) =   193.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.40
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    9.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.82
  STREET FLOW TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =    6.15
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.182
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.780
  SUBAREA AREA(ACRES) =    3.10      SUBAREA RUNOFF(CFS) =   10.11
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      10.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.24
  FLOW VELOCITY(FEET/SEC.) =  3.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    306.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.55
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.76
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.44
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.26
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    306.00 =     238.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.161
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.30
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =      11.68
  TC(MIN.) =    6.26

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    308.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.34
  FLOW LENGTH(FEET) =    66.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.93
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.68
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    6.42
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =     304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.131
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.61
  TOTAL AREA(ACRES) =        4.1   TOTAL RUNOFF(CFS) =      13.21
  TC(MIN.) =    6.42

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    310.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.99
  FLOW LENGTH(FEET) =   101.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.07
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.21
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    6.65
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =     405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.086
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.59
  TOTAL AREA(ACRES) =        4.6   TOTAL RUNOFF(CFS) =      14.66
  TC(MIN.) =    6.65

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    312.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.55
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.66
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.76
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    312.00 =     450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    312.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.066
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.59
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      16.17
  TC(MIN.) =    6.76

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    319.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.39
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.53
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.17
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    6.89
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    319.00 =     511.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    319.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.040
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    2.10   SUBAREA RUNOFF(CFS) =    6.62
  TOTAL AREA(ACRES) =        7.2   TOTAL RUNOFF(CFS) =      22.69
  TC(MIN.) =    6.89

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    323.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    92.47
  FLOW LENGTH(FEET) =   753.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.69
  PIPE TRAVEL TIME(MIN.) =   1.53    Tc(MIN.) =    8.43
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    323.00 =    1264.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.748
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    2.20   SUBAREA RUNOFF(CFS) =    6.43
  TOTAL AREA(ACRES) =        9.4   TOTAL RUNOFF(CFS) =      27.48
  TC(MIN.) =    8.43

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    331.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.92
  FLOW LENGTH(FEET) =   108.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.43
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.48
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    8.64
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    331.00 =    1372.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    331.00 TO NODE    331.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.708
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    4.30   SUBAREA RUNOFF(CFS) =   12.44
  TOTAL AREA(ACRES) =       13.7   TOTAL RUNOFF(CFS) =      39.62
  TC(MIN.) =    8.64

****************************************************************************
  FLOW PROCESS FROM NODE    331.00 TO NODE    332.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.61
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.39
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.62
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    8.71
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    332.00 =    1411.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    332.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.695
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    3.17
  TOTAL AREA(ACRES) =       14.8   TOTAL RUNOFF(CFS) =      42.65
  TC(MIN.) =    8.71

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    337.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.95
  FLOW LENGTH(FEET) =   105.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.51
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      42.65
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    8.90
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    337.00 =    1516.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    337.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.660
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    7.71
  TOTAL AREA(ACRES) =       17.5   TOTAL RUNOFF(CFS) =      49.95
  TC(MIN.) =    8.90

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    351.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    92.86
  FLOW LENGTH(FEET) =   714.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.66
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      49.95
  PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =   10.13
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    351.10 =    2230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    351.10 TO NODE    351.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.13
  RAINFALL INTENSITY(INCH/HR) =   3.44
  TOTAL STREAM AREA(ACRES) =    17.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.95

****************************************************************************
  FLOW PROCESS FROM NODE    339.10 TO NODE    339.20 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE    339.20 TO NODE    340.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  100.00  DOWNSTREAM ELEVATION(FEET) =   95.64
  STREET LENGTH(FEET) =   218.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   1.35   Tc(MIN.) =    6.35
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.144
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.830
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    3.78
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       4.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.12
  FLOW VELOCITY(FEET/SEC.) =  3.12   DEPTH*VELOCITY(FT*FT/SEC.) =   1.02
  LONGEST FLOWPATH FROM NODE    339.10 TO NODE    340.00 =     308.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    342.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.37
  FLOW LENGTH(FEET) =   163.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.13
```

```
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    6.85
  LONGEST FLOWPATH FROM NODE    339.10 TO NODE    342.00 =     471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    342.00 TO NODE    342.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.048
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    4.37
  TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =       8.40
  TC(MIN.) =    6.85

****************************************************************************
  FLOW PROCESS FROM NODE    342.00 TO NODE    344.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.02
  FLOW LENGTH(FEET) =   198.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.34
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.40
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =    7.37
  LONGEST FLOWPATH FROM NODE    339.10 TO NODE    344.00 =     669.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    344.00 TO NODE    344.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.950
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    3.61
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =      11.80
  TC(MIN.) =    7.37

****************************************************************************
  FLOW PROCESS FROM NODE    344.00 TO NODE    346.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    97.01
  FLOW LENGTH(FEET) =   299.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.94
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.80
```

```
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =    8.09
  LONGEST FLOWPATH FROM NODE    339.10 TO NODE    346.00 =     968.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    346.00 TO NODE    346.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.813
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    4.11
  TOTAL AREA(ACRES) =        4.9   TOTAL RUNOFF(CFS) =      15.51
  TC(MIN.) =    8.09

****************************************************************************
  FLOW PROCESS FROM NODE    346.00 TO NODE    350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.94
  FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.46
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.51
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    8.33
  LONGEST FLOWPATH FROM NODE    339.10 TO NODE    350.00 =    1074.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.768
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    2.50   SUBAREA RUNOFF(CFS) =    7.82
  TOTAL AREA(ACRES) =        7.4   TOTAL RUNOFF(CFS) =      23.14
  TC(MIN.) =    8.33

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    351.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.17
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.21
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.14
```

```
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    8.49
  LONGEST FLOWPATH FROM NODE    339.10 TO NODE    351.10 =    1157.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    351.10 TO NODE    351.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.49
  RAINFALL INTENSITY(INCH/HR) =   3.74
  TOTAL STREAM AREA(ACRES) =     7.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.14

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       49.95    10.13        3.436         17.50
      2       23.14     8.49        3.736          7.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       65.04     8.49       3.736
      2       71.24    10.13       3.436

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      71.24   Tc(MIN.) =   10.13
  TOTAL AREA(ACRES) =       24.9
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    351.10 =    2230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    351.10 TO NODE    357.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.02
  FLOW LENGTH(FEET) =    98.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.73
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      71.24
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   10.28
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    357.10 =    2328.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.10 TO NODE    357.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   10.28
  RAINFALL INTENSITY(INCH/HR) =   3.42
  TOTAL STREAM AREA(ACRES) =    24.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     71.24

****************************************************************************
  FLOW PROCESS FROM NODE    352.00 TO NODE    353.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE    353.00 TO NODE    354.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  100.00  DOWNSTREAM ELEVATION(FEET) =   96.78
  STREET LENGTH(FEET) =   161.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.06
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    6.14
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.52
  STREET FLOW TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =    6.17
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.177
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.830
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.39
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       1.73

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.72
  FLOW VELOCITY(FEET/SEC.) =  2.54   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    354.00 =    9161.00 FEET.

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

```
  FLOW PROCESS FROM NODE    354.00 TO NODE    355.00 IS CODE =  31
----------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.67
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.24
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.73
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    6.30
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    355.00 =    9194.00 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE    355.00 TO NODE    355.00 IS CODE =  81
----------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.152
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    3.79
  TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       5.51
  TC(MIN.) =    6.30

**********************************************************************
  FLOW PROCESS FROM NODE    355.00 TO NODE    356.00 IS CODE =  31
----------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    96.50
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.51
  PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =    7.31
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    356.00 =    9544.00 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE    356.00 TO NODE    356.00 IS CODE =  81
----------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.961
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    2.63
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       7.89
  TC(MIN.) =    7.31
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    356.00 TO NODE    357.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.15
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.89
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    357.00 =    9629.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.00 TO NODE    357.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.918
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    2.28
  TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =      10.08
  TC(MIN.) =    7.54

****************************************************************************
  FLOW PROCESS FROM NODE    357.00 TO NODE    357.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.64
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.08
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    7.63
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    357.10 =    9665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.10 TO NODE    357.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.63
  RAINFALL INTENSITY(INCH/HR) =   3.90
  TOTAL STREAM AREA(ACRES) =     3.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.08
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       71.24    10.28        3.419         24.90
      2       10.08     7.63        3.901          3.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       72.52     7.63       3.901
      2       80.08    10.28       3.419

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      80.08   Tc(MIN.) =   10.28
  TOTAL AREA(ACRES) =       28.0
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    357.10 =    9665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    357.10 TO NODE    358.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.44
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.14
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      80.08
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   10.51
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    358.00 =    9821.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    358.00 TO NODE    358.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.394
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7995
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    1.97
  TOTAL AREA(ACRES) =       28.7   TOTAL RUNOFF(CFS) =      80.08
  TC(MIN.) =   10.51
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    358.00 TO NODE    367.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.77
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.14
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      80.08
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   10.70
  LONGEST FLOWPATH FROM NODE    352.00 TO NODE    367.00 =    9944.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    367.00 TO NODE    367.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.70
  RAINFALL INTENSITY(INCH/HR) =   3.37
  TOTAL STREAM AREA(ACRES) =    28.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     80.08

****************************************************************************
  FLOW PROCESS FROM NODE    359.00 TO NODE    359.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE    359.10 TO NODE    360.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  100.00  DOWNSTREAM ELEVATION(FEET) =   97.18
  STREET LENGTH(FEET) =   141.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
  STREET FLOW TRAVEL TIME(MIN.) =   0.92   Tc(MIN.) =    5.92
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.225
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.830
 SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.81
 TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   9.95
 FLOW VELOCITY(FEET/SEC.) =  2.93   DEPTH*VELOCITY(FT*FT/SEC.) =   0.89
 LONGEST FLOWPATH FROM NODE    359.00 TO NODE    360.00 =  900141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    360.00 TO NODE    362.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.31
 FLOW LENGTH(FEET) =   169.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.01
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.16
 PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =    6.48
 LONGEST FLOWPATH FROM NODE    359.00 TO NODE    362.00 =  900310.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    362.00 TO NODE    362.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.118
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
 SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    2.73
 TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       5.81
 TC(MIN.) =    6.48

****************************************************************************
 FLOW PROCESS FROM NODE    362.00 TO NODE    364.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.08
 FLOW LENGTH(FEET) =    92.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.87
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.81
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    6.74
 LONGEST FLOWPATH FROM NODE    359.00 TO NODE    364.00 =  900402.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    364.00 TO NODE    364.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.069
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    2.36
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       8.11
  TC(MIN.) =    6.74

****************************************************************************
  FLOW PROCESS FROM NODE    364.00 TO NODE    366.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.06
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.30
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.11
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    7.26
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    366.00 =  900596.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    366.00 TO NODE    366.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.971
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    1.20   SUBAREA RUNOFF(CFS) =    3.96
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =      11.87
  TC(MIN.) =    7.26

****************************************************************************
  FLOW PROCESS FROM NODE    366.00 TO NODE    367.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.64
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.95
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.87
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    7.34
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    367.00 =  900632.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    367.00 TO NODE    367.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.34
  RAINFALL INTENSITY(INCH/HR) =   3.95
  TOTAL STREAM AREA(ACRES) =     3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.87

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc       INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       80.08    10.70        3.373         28.70
      2       11.87     7.34        3.955          3.60

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       80.16     7.34       3.955
      2       90.20    10.70       3.373

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      90.20   Tc(MIN.) =   10.70
  TOTAL AREA(ACRES) =       32.3
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    367.00 =  900632.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    367.00 TO NODE    398.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.92
  FLOW LENGTH(FEET) =   108.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.32
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      90.20
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.86
  LONGEST FLOWPATH FROM NODE    359.00 TO NODE    398.00 =  900740.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    367.10 TO NODE    367.20 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
 SUBAREA RUNOFF(CFS) =      0.34
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
 FLOW PROCESS FROM NODE    367.20 TO NODE    368.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     93.94
 CHANNEL LENGTH THRU SUBAREA(FEET) =   303.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.867
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.65
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.80
 AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   2.81
 Tc(MIN.) =    7.81
 SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.60
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.780
 TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.90

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   2.03
 LONGEST FLOWPATH FROM NODE    367.10 TO NODE    368.00 = ********** FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    368.00 TO NODE    370.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.02
 FLOW LENGTH(FEET) =    98.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.51
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.90
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =    8.27
 LONGEST FLOWPATH FROM NODE    367.10 TO NODE    370.00 = ********** FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    370.00 TO NODE    370.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.779
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
 SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    2.06
 TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.95
```

```
  TC(MIN.) =    8.27

****************************************************************************
  FLOW PROCESS FROM NODE    370.00 TO NODE    372.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.59
  FLOW LENGTH(FEET) =   141.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.95
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =    8.75
  LONGEST FLOWPATH FROM NODE    367.10 TO NODE    372.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    372.00 TO NODE    372.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.688
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    2.01
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       4.89
  TC(MIN.) =    8.75

****************************************************************************
  FLOW PROCESS FROM NODE    372.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.63
  FLOW LENGTH(FEET) =   137.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.63
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.89
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    9.15
  LONGEST FLOWPATH FROM NODE    367.10 TO NODE    374.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.611
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
```

```
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.41
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       6.20
  TC(MIN.) =    9.15

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    379.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.96
  FLOW LENGTH(FEET) =   104.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.20
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    9.44
  LONGEST FLOWPATH FROM NODE    367.10 TO NODE    379.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    379.00 TO NODE    379.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.556
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
  SUBAREA AREA(ACRES) =    2.20   SUBAREA RUNOFF(CFS) =    6.10
  TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =      12.20
  TC(MIN.) =    9.44

****************************************************************************
  FLOW PROCESS FROM NODE    379.00 TO NODE    380.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.26
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.98
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.20
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    9.62
  LONGEST FLOWPATH FROM NODE    367.10 TO NODE    380.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    380.00 TO NODE    380.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.522
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7907
```

```
  SUBAREA AREA(ACRES) =    1.20   SUBAREA RUNOFF(CFS) =    3.51
  TOTAL AREA(ACRES) =        5.6   TOTAL RUNOFF(CFS) =      15.60
  TC(MIN.) =    9.62

****************************************************************************
  FLOW PROCESS FROM NODE    380.00 TO NODE    382.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.56
  FLOW LENGTH(FEET) =   144.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.47
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.60
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    9.94
  LONGEST FLOWPATH FROM NODE    367.10 TO NODE    382.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    382.00 TO NODE    382.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.461
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7951
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    2.01
  TOTAL AREA(ACRES) =        6.3   TOTAL RUNOFF(CFS) =      17.34
  TC(MIN.) =    9.94

****************************************************************************
  FLOW PROCESS FROM NODE    382.00 TO NODE    384.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.36
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.63
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.34
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   10.08
  LONGEST FLOWPATH FROM NODE    367.10 TO NODE    384.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    384.00 TO NODE    384.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.441
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7994
```

```
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.57
  TOTAL AREA(ACRES) =        7.2   TOTAL RUNOFF(CFS) =      19.81
  TC(MIN.) =   10.08

****************************************************************************
  FLOW PROCESS FROM NODE    385.00 TO NODE    399.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.92
  FLOW LENGTH(FEET) =   108.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.78
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.81
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   10.31
  LONGEST FLOWPATH FROM NODE    367.10 TO NODE    399.00 = ********** FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.2  TC(MIN.) =     10.31
  PEAK FLOW RATE(CFS)   =      19.81
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                               San Diego, California 92110
                             619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 600 PROPOSED CONDITION                                           *
 **************************************************************************

  FILE NAME: SS06HP00.RAT
  TIME/DATE OF STUDY: 14:50 03/01/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    87.90
  UPSTREAM ELEVATION(FEET) =    491.00
  DOWNSTREAM ELEVATION(FEET) =    490.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.355
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    66.38
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    680.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   481.00
  FLOW LENGTH(FEET) =  1863.70   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.05
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.35
  PIPE TRAVEL TIME(MIN.) =  15.12    Tc(MIN.) =   19.47
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    680.00 =    1951.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    680.00 TO NODE    680.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.542
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =   66.90   SUBAREA RUNOFF(CFS) =  134.37
  TOTAL AREA(ACRES) =       67.0   TOTAL RUNOFF(CFS) =     134.57
  TC(MIN.) =   19.47
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       67.0  TC(MIN.) =     19.47
  PEAK FLOW RATE(CFS)   =     134.57
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                     *
* 100-YEAR, 6-HOUR STORM EVENT                                            *
* BASIN 700 PROPOSED CONDITION                                            *
 ***************************************************************************

  FILE NAME: SS07HP00.RAT
  TIME/DATE OF STUDY: 14:17 02/21/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   106.00
  UPSTREAM ELEVATION(FEET) =    491.00
  DOWNSTREAM ELEVATION(FEET) =    490.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.913
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.71
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.71

******************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    780.00 IS CODE =  41
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   354.00
  FLOW LENGTH(FEET) =  1896.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.66
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.71
  PIPE TRAVEL TIME(MIN.) =   5.58    Tc(MIN.) =  11.58
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    780.00 =  2002.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    780.00 TO NODE    780.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.276
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =  87
  SUBAREA AREA(ACRES) =   22.40   SUBAREA RUNOFF(CFS) =   61.64
  TOTAL AREA(ACRES) =     22.60   TOTAL RUNOFF(CFS) =   62.34
  TC(MIN.) =  11.58
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     22.60  TC(MIN.) =     11.58
  PEAK FLOW RATE(CFS)   =     62.34
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                          Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                         San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-15013C SOUTH OTAY                                                     *
* 100-YEAR, 6-HOUR STORM EVENT                                            *
* BASIN 800 PROPOSED CONDITION                                            *
 ***************************************************************************

  FILE NAME: SS08HP00.RAT
  TIME/DATE OF STUDY: 14:20 02/21/2018
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    801.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =  87
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   105.00
  UPSTREAM ELEVATION(FEET) =    482.00
  DOWNSTREAM ELEVATION(FEET) =    481.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.874
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.35

******************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    880.00 IS CODE =  41
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   481.00  DOWNSTREAM(FEET) =   358.00
  FLOW LENGTH(FEET) =  1452.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS   1.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.86
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.35
  PIPE TRAVEL TIME(MIN.) =   4.98    Tc(MIN.) =  10.98
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    880.00 =  1557.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    880.00 TO NODE    880.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.342
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =  87
  SUBAREA AREA(ACRES) =    8.00   SUBAREA RUNOFF(CFS) =   22.46
  TOTAL AREA(ACRES) =      8.10   TOTAL RUNOFF(CFS) =   22.81
  TC(MIN.) =  10.98
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      8.10  TC(MIN.) =     10.98
  PEAK FLOW RATE(CFS)   =     22.81
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 900 PROPOSED CONDITION                                           *
 **************************************************************************

  FILE NAME: SS09HP00.RAT
  TIME/DATE OF STUDY: 14:46 03/01/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    900.00 TO NODE    901.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.90
  UPSTREAM ELEVATION(FEET) =    499.00
  DOWNSTREAM ELEVATION(FEET) =    498.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.391
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    66.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    905.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   498.00  DOWNSTREAM(FEET) =   489.00
  FLOW LENGTH(FEET) =  1869.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.35
  PIPE TRAVEL TIME(MIN.) =  15.39    Tc(MIN.) =   19.78
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    905.00 =    1959.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    905.00 TO NODE    905.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.518
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =   38.40   SUBAREA RUNOFF(CFS) =   76.37
  TOTAL AREA(ACRES) =       38.5   TOTAL RUNOFF(CFS) =      76.57
  TC(MIN.) =   19.78

****************************************************************************
  FLOW PROCESS FROM NODE    905.00 TO NODE    910.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   489.00  DOWNSTREAM(FEET) =   486.00
  FLOW LENGTH(FEET) =   688.32   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.05
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      76.57
  PIPE TRAVEL TIME(MIN.) =   1.43    Tc(MIN.) =   21.21
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    910.00 =    2648.22 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    910.00 TO NODE    910.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.428
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =   10.16
  TOTAL AREA(ACRES) =       43.8   TOTAL RUNOFF(CFS) =      84.00
  TC(MIN.) =   21.21

****************************************************************************
  FLOW PROCESS FROM NODE    910.00 TO NODE    980.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   486.00  DOWNSTREAM(FEET) =   484.00
  FLOW LENGTH(FEET) =   460.40   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.13
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      84.00
  PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =   22.15
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    980.00 =    3108.62 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    980.00 TO NODE    980.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.371
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    9.20   SUBAREA RUNOFF(CFS) =   17.23
  TOTAL AREA(ACRES) =       53.0   TOTAL RUNOFF(CFS) =      99.27
  TC(MIN.) =   22.15

****************************************************************************
  FLOW PROCESS FROM NODE    980.00 TO NODE    999.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   484.00  DOWNSTREAM(FEET) =   476.00
  FLOW LENGTH(FEET) =  1513.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.23
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      99.27
  PIPE TRAVEL TIME(MIN.) =   2.73    Tc(MIN.) =   24.88
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    999.00 =    4621.92 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       53.0  TC(MIN.) =     24.88
  PEAK FLOW RATE(CFS)   =      99.27
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                          619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 1000 POST-PROJECT                                                *
 ************************************************************************

  FILE NAME: SS10HP00.RAT
  TIME/DATE OF STUDY: 16:56 04/19/2023
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *USER SPECIFIED TIME OF  5.0 MIN. TO BE ADDED TO THE TIME-OF-CONCENTRATION
    FOR NATURAL WATERSHED DETERMINED BY THE COUNTY OF SAN DIEGO HYDROLOGY
    MANUAL (APPENDIX X-A).*
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
```

```
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1001.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1080.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   526.00  DOWNSTREAM(FEET) =   408.00
  FLOW LENGTH(FEET) =  2100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS   1.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.29
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.37
  PIPE TRAVEL TIME(MIN.) =   8.15    Tc(MIN.) =   13.15
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1080.00 =    2221.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1080.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.103
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4540
```

```
  SUBAREA AREA(ACRES) =    9.70   SUBAREA RUNOFF(CFS) =   13.54
  TOTAL AREA(ACRES) =        9.8   TOTAL RUNOFF(CFS) =      13.81
  TC(MIN.) =   13.15

****************************************************************************
  FLOW PROCESS FROM NODE   1080.00 TO NODE   1080.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.103
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7639
  SUBAREA AREA(ACRES) =   39.90   SUBAREA RUNOFF(CFS) =  104.00
  TOTAL AREA(ACRES) =       49.7   TOTAL RUNOFF(CFS) =     117.80
  TC(MIN.) =   13.15
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       49.7  TC(MIN.) =     13.15
  PEAK FLOW RATE(CFS)   =     117.80
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                          619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 1100 PROPOSED CONDITION                                          *
 **************************************************************************

  FILE NAME: SS11HP00.RAT
  TIME/DATE OF STUDY: 10:56 04/20/2023
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *USER SPECIFIED TIME OF  5.0 MIN. TO BE ADDED TO THE TIME-OF-CONCENTRATION
    FOR NATURAL WATERSHED DETERMINED BY THE COUNTY OF SAN DIEGO HYDROLOGY
    MANUAL (APPENDIX X-A).*
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
```

```
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1101.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE   1101.00 TO NODE   1180.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   499.00  DOWNSTREAM(FEET) =   398.00
  FLOW LENGTH(FEET) =  1600.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS   1.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.37
  PIPE TRAVEL TIME(MIN.) =   5.96    Tc(MIN.) =   10.96
  LONGEST FLOWPATH FROM NODE   1100.00 TO NODE   1180.00 =    1692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1160.00 TO NODE   1180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.344
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4605
```

```
  SUBAREA AREA(ACRES) =    3.60   SUBAREA RUNOFF(CFS) =    5.42
  TOTAL AREA(ACRES) =        3.7   TOTAL RUNOFF(CFS) =       5.70
  TC(MIN.) =   10.96

****************************************************************************
  FLOW PROCESS FROM NODE   1180.00 TO NODE   1180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.344
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7637
  SUBAREA AREA(ACRES) =   14.70   SUBAREA RUNOFF(CFS) =   41.29
  TOTAL AREA(ACRES) =       18.4   TOTAL RUNOFF(CFS) =      46.99
  TC(MIN.) =   10.96
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       18.4  TC(MIN.) =     10.96
  PEAK FLOW RATE(CFS)   =      46.99
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                          619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 1200 PROPOSED CONDITION                                          *
 **************************************************************************

  FILE NAME: SS12HP00.RAT
  TIME/DATE OF STUDY: 09:57 04/20/2023
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *USER SPECIFIED TIME OF  5.0 MIN. TO BE ADDED TO THE TIME-OF-CONCENTRATION
    FOR NATURAL WATERSHED DETERMINED BY THE COUNTY OF SAN DIEGO HYDROLOGY
    MANUAL (APPENDIX X-A).*
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
```

```
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1200.00 TO NODE   1201.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE   1280.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   514.00  DOWNSTREAM(FEET) =   354.00
  FLOW LENGTH(FEET) =  1835.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS   1.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.97
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.37
  PIPE TRAVEL TIME(MIN.) =   6.15    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1280.00 =    1835.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1260.00 TO NODE   1280.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.323
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4618
```

```
  SUBAREA AREA(ACRES) =    3.20   SUBAREA RUNOFF(CFS) =    4.79
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       5.06
  TC(MIN.) =   11.15

****************************************************************************
  FLOW PROCESS FROM NODE   1280.00 TO NODE   1280.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.323
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7959
  SUBAREA AREA(ACRES) =   25.00   SUBAREA RUNOFF(CFS) =   69.78
  TOTAL AREA(ACRES) =       28.3   TOTAL RUNOFF(CFS) =      74.85
  TC(MIN.) =   11.15
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       28.3  TC(MIN.) =     11.15
  PEAK FLOW RATE(CFS)   =      74.85
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                            San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTH OTAY                                                    *
* 100-YEAR, 6-HOUR STORM EVENT                                           *
* BASIN 1300 PROPOSED CONDITION                                          *
 **************************************************************************

  FILE NAME: SS13HP00.RAT
  TIME/DATE OF STUDY: 11:09 04/20/2023
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  *USER SPECIFIED TIME OF  5.0 MIN. TO BE ADDED TO THE TIME-OF-CONCENTRATION
    FOR NATURAL WATERSHED DETERMINED BY THE COUNTY OF SAN DIEGO HYDROLOGY
    MANUAL (APPENDIX X-A).*
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
```

```
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1300.00 TO NODE   1301.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      0.37
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE   1301.00 TO NODE   1380.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   492.00  DOWNSTREAM(FEET) =   376.00
  FLOW LENGTH(FEET) =  3285.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS   1.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.63
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.37
  PIPE TRAVEL TIME(MIN.) =  15.10    Tc(MIN.) =   20.10
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1380.00 =    3285.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1360.00 TO NODE   1380.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.494
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4580
```

```
  SUBAREA AREA(ACRES) =    4.80   SUBAREA RUNOFF(CFS) =    5.39
  TOTAL AREA(ACRES) =        4.9   TOTAL RUNOFF(CFS) =       5.60
  TC(MIN.) =   20.10

****************************************************************************
  FLOW PROCESS FROM NODE   1380.00 TO NODE   1380.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.494
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7513
  SUBAREA AREA(ACRES) =   16.20   SUBAREA RUNOFF(CFS) =   33.94
  TOTAL AREA(ACRES) =       21.1   TOTAL RUNOFF(CFS) =      39.54
  TC(MIN.) =   20.10
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       21.1  TC(MIN.) =     20.10
  PEAK FLOW RATE(CFS)   =      39.54
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                               San Diego, California 92110
                             619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* J-15013C SOUTHWEST VILLAGE                                            *
* 100-YEAR, 6-HOUR STORM EVENT                                          *
* BASIN 1400 - MOODY CANYON POST UNDETAINED                             *
 ************************************************************************

  FILE NAME: S1014U00.RAT
  TIME/DATE OF STUDY: 12:08 02/18/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   1400.00 TO NODE   1401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    100.00
  DOWNSTREAM ELEVATION(FEET) =     98.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.269
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.349
  SUBAREA RUNOFF(CFS) =      0.91
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.91

****************************************************************************
  FLOW PROCESS FROM NODE   1401.00 TO NODE   1402.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  100.00  DOWNSTREAM ELEVATION(FEET) =   83.00
  STREET LENGTH(FEET) =   850.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.38
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   15.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.43
  STREET FLOW TRAVEL TIME(MIN.) =   4.15   Tc(MIN.) =    9.42
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.560
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
  SUBAREA AREA(ACRES) =   13.10      SUBAREA RUNOFF(CFS) =   32.64
  TOTAL AREA(ACRES) =       13.4        PEAK FLOW RATE(CFS) =      33.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  20.40
  FLOW VELOCITY(FEET/SEC.) =  4.02   DEPTH*VELOCITY(FT*FT/SEC.) =   2.04
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  850.0 FT WITH ELEVATION-DROP =  17.0 FT, IS   39.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1402.00
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1402.00 =     950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1402.00 TO NODE   1404.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     52.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   950.00   CHANNEL SLOPE =  0.0500
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.225
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      46.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.04
  AVERAGE FLOW DEPTH(FEET) =   0.62   TRAVEL TIME(MIN.) =   2.62
  Tc(MIN.) =   12.04
  SUBAREA AREA(ACRES) =    17.30       SUBAREA RUNOFF(CFS) =   26.78
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.576
  TOTAL AREA(ACRES) =       30.7         PEAK FLOW RATE(CFS) =      57.04

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.69   FLOW VELOCITY(FEET/SEC.) =   6.46
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1404.00 =    1900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1404.00 TO NODE   1404.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.225
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6085
  SUBAREA AREA(ACRES) =    5.20   SUBAREA RUNOFF(CFS) =   13.42
  TOTAL AREA(ACRES) =       35.9   TOTAL RUNOFF(CFS) =      70.45
  TC(MIN.) =   12.04

****************************************************************************
  FLOW PROCESS FROM NODE   1404.00 TO NODE   1405.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     43.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1415.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.859
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      86.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.79
  AVERAGE FLOW DEPTH(FEET) =   0.93   TRAVEL TIME(MIN.) =   3.47
  Tc(MIN.) =   15.51
  SUBAREA AREA(ACRES) =    24.40       SUBAREA RUNOFF(CFS) =   31.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.544
  TOTAL AREA(ACRES) =       60.3         PEAK FLOW RATE(CFS) =      93.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.97   FLOW VELOCITY(FEET/SEC.) =   7.01
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1405.00 =    3315.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1405.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.51
  RAINFALL INTENSITY(INCH/HR) =   2.86
  TOTAL STREAM AREA(ACRES) =    60.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     93.84
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    199.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.88   RAIN INTENSITY(INCH/HOUR) =  3.13
  TOTAL AREA(ACRES) =    16.50   TOTAL RUNOFF(CFS) =     29.77

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE   1405.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     70.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.884
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.40
  AVERAGE FLOW DEPTH(FEET) =   0.62   TRAVEL TIME(MIN.) =   2.31
  Tc(MIN.) =   15.19
  SUBAREA AREA(ACRES) =    18.60       SUBAREA RUNOFF(CFS) =   24.14
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.509
  TOTAL AREA(ACRES) =       35.1         PEAK FLOW RATE(CFS) =      51.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   5.78
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE   1405.00 =     750.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1405.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.19
  RAINFALL INTENSITY(INCH/HR) =   2.88
  TOTAL STREAM AREA(ACRES) =    35.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     51.55

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       93.84    15.51        2.859         60.30
      2       51.55    15.19        2.884         35.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      143.45    15.19       2.884
      2      144.93    15.51       2.859

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     144.93   Tc(MIN.) =   15.51
  TOTAL AREA(ACRES) =       95.4
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1405.00 =    3315.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1410.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     81.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   475.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.780
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     148.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.99
  AVERAGE FLOW DEPTH(FEET) =   1.24   TRAVEL TIME(MIN.) =   0.99
  Tc(MIN.) =   16.51
  SUBAREA AREA(ACRES) =     5.10       SUBAREA RUNOFF(CFS) =    6.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.527
  TOTAL AREA(ACRES) =      100.5         PEAK FLOW RATE(CFS) =     147.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.23   FLOW VELOCITY(FEET/SEC.) =   8.00
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1410.00 =    3790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1410.00 TO NODE   1410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.51
  RAINFALL INTENSITY(INCH/HR) =   2.78
  TOTAL STREAM AREA(ACRES) =   100.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    147.29

****************************************************************************
  FLOW PROCESS FROM NODE    299.00 TO NODE    299.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.50   RAIN INTENSITY(INCH/HOUR) =  3.29
  TOTAL AREA(ACRES) =    60.70   TOTAL RUNOFF(CFS) =     99.66

****************************************************************************
  FLOW PROCESS FROM NODE    299.00 TO NODE   1410.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     58.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1050.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.024
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     112.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.38
  AVERAGE FLOW DEPTH(FEET) =   1.07   TRAVEL TIME(MIN.) =   2.37
  Tc(MIN.) =   13.87
  SUBAREA AREA(ACRES) =    18.20       SUBAREA RUNOFF(CFS) =   24.77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.488
  TOTAL AREA(ACRES) =       78.9         PEAK FLOW RATE(CFS) =     116.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.09   FLOW VELOCITY(FEET/SEC.) =   7.46
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE   1410.00 =    1800.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1410.00 TO NODE   1410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.87
```

```
 RAINFALL INTENSITY(INCH/HR) =   3.02
 TOTAL STREAM AREA(ACRES) =    78.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    116.51

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      147.29    16.51        2.780        100.50
     2      116.51    13.87        3.024         78.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      251.89    13.87       3.024
     2      254.38    16.51       2.780

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     254.38   Tc(MIN.) =   16.51
 TOTAL AREA(ACRES) =      179.4
 LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1410.00 =    3790.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1410.00 TO NODE   1420.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     60.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00   CHANNEL SLOPE =  0.0400
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.638
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     263.88
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.44
 AVERAGE FLOW DEPTH(FEET) =   1.67   TRAVEL TIME(MIN.) =   1.76
 Tc(MIN.) =   18.27
 SUBAREA AREA(ACRES) =    16.00       SUBAREA RUNOFF(CFS) =   19.00
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.505
 TOTAL AREA(ACRES) =      195.4         PEAK FLOW RATE(CFS) =     260.46

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.66   FLOW VELOCITY(FEET/SEC.) =   9.43
 LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1420.00 =    4790.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1420.00 TO NODE   1420.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.27
  RAINFALL INTENSITY(INCH/HR) =   2.64
  TOTAL STREAM AREA(ACRES) =   195.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    260.46

****************************************************************************
  FLOW PROCESS FROM NODE   1416.00 TO NODE   1417.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    100.00
  DOWNSTREAM ELEVATION(FEET) =     98.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.562
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.723
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE   1417.00 TO NODE   1418.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     54.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   760.00   CHANNEL SLOPE =  0.0600
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.336
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.12
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   2.47
```

```
  Tc(MIN.) =   11.03
  SUBAREA AREA(ACRES) =     1.40       SUBAREA RUNOFF(CFS) =    2.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       2.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   6.31
  LONGEST FLOWPATH FROM NODE   1416.00 TO NODE   1418.00 =     860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1418.00 TO NODE   1420.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     51.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   490.00   CHANNEL SLOPE =  0.1000
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.043
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.06
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   2.67
  Tc(MIN.) =   13.70
  SUBAREA AREA(ACRES) =     2.20       SUBAREA RUNOFF(CFS) =    3.01
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        3.7         PEAK FLOW RATE(CFS) =       5.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   3.42
  LONGEST FLOWPATH FROM NODE   1416.00 TO NODE   1420.00 =    1350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1420.00 TO NODE   1420.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.70
  RAINFALL INTENSITY(INCH/HR) =   3.04
  TOTAL STREAM AREA(ACRES) =     3.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.07

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      260.46    18.27        2.638        195.40
      2        5.07    13.70        3.043          3.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      230.91    13.70       3.043
      2      264.85    18.27       2.638

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     264.85   Tc(MIN.) =   18.27
  TOTAL AREA(ACRES) =      199.1
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1420.00 =    4790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1420.00 TO NODE   1430.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =      0.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2500.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.348
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     299.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.77
  AVERAGE FLOW DEPTH(FEET) =   1.79   TRAVEL TIME(MIN.) =   4.26
  Tc(MIN.) =   22.53
  SUBAREA AREA(ACRES) =    66.00       SUBAREA RUNOFF(CFS) =   69.74
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.491
  TOTAL AREA(ACRES) =      265.1         PEAK FLOW RATE(CFS) =     305.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.80   FLOW VELOCITY(FEET/SEC.) =   9.84
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1430.00 =    7290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1430.00 TO NODE   1430.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.53
  RAINFALL INTENSITY(INCH/HR) =   2.35
  TOTAL STREAM AREA(ACRES) =   265.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    305.44

****************************************************************************
  FLOW PROCESS FROM NODE   1427.00 TO NODE   1428.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    100.00
  DOWNSTREAM ELEVATION(FEET) =     98.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.562
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.723
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE   1428.00 TO NODE   1429.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    200.00  DOWNSTREAM(FEET) =     56.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2400.00   CHANNEL SLOPE =  0.0600
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.020
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.49
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   5.34
  Tc(MIN.) =   13.91
  SUBAREA AREA(ACRES) =     4.80       SUBAREA RUNOFF(CFS) =    6.52
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        4.9         PEAK FLOW RATE(CFS) =       6.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   9.36
 LONGEST FLOWPATH FROM NODE   1427.00 TO NODE   1429.00 =    2500.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1429.00 TO NODE   1430.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    96.25
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.03
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.66
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.02
 LONGEST FLOWPATH FROM NODE   1427.00 TO NODE   1430.00 =    2575.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1430.00 TO NODE   1430.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.02
 RAINFALL INTENSITY(INCH/HR) =   3.01
 TOTAL STREAM AREA(ACRES) =     4.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.66

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      305.44    22.53        2.348        265.10
     2        6.66    14.02        3.008          4.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      245.08    14.02       3.008
     2      310.63    22.53       2.348

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     310.63   Tc(MIN.) =   22.53
 TOTAL AREA(ACRES) =      270.0
```

```
 LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1430.00 =    7290.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1430.00 TO NODE   1498.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.70
 FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.15
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     310.63
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   22.59
 LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1498.00 =    7355.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1498.00 TO NODE   1498.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   22.59
 RAINFALL INTENSITY(INCH/HR) =   2.34
 TOTAL STREAM AREA(ACRES) =   270.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    310.63

****************************************************************************
 FLOW PROCESS FROM NODE   1450.00 TO NODE   1451.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    100.00
 DOWNSTREAM ELEVATION(FEET) =     98.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.562
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.723
 SUBAREA RUNOFF(CFS) =      0.17
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.17
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1451.00 TO NODE   1453.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     43.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   950.00   CHANNEL SLOPE =  0.0600
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.319
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.03
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   2.63
  Tc(MIN.) =   11.19
  SUBAREA AREA(ACRES) =     2.40       SUBAREA RUNOFF(CFS) =    3.58
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        2.5         PEAK FLOW RATE(CFS) =       3.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =   7.74
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1453.00 =    1050.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1453.00 TO NODE   1453.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.319
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =    2.30   SUBAREA RUNOFF(CFS) =    3.44
  TOTAL AREA(ACRES) =        4.8   TOTAL RUNOFF(CFS) =       7.17
  TC(MIN.) =   11.19

****************************************************************************
  FLOW PROCESS FROM NODE   1453.00 TO NODE   1454.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     25.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1250.00   CHANNEL SLOPE =  0.0600
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   4.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.101
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.54
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.49
 AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   1.99
 Tc(MIN.) =   13.17
 SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    4.74
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
 TOTAL AREA(ACRES) =        8.2         PEAK FLOW RATE(CFS) =      11.44

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =  11.09
 LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1454.00 =    2300.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1454.00 TO NODE   1454.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.101
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
 SUBAREA AREA(ACRES) =    4.90   SUBAREA RUNOFF(CFS) =    6.84
 TOTAL AREA(ACRES) =       13.1   TOTAL RUNOFF(CFS) =      18.28
 TC(MIN.) =   13.17

****************************************************************************
 FLOW PROCESS FROM NODE   1454.00 TO NODE   1455.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     37.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1050.00   CHANNEL SLOPE =  0.0600
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   4.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.952
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.48
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.94
 AVERAGE FLOW DEPTH(FEET) =   0.75   TRAVEL TIME(MIN.) =   1.35
 Tc(MIN.) =   14.53
 SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    2.39
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
```

```
  TOTAL AREA(ACRES) =       14.9         PEAK FLOW RATE(CFS) =      19.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.76   FLOW VELOCITY(FEET/SEC.) =  13.02
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1455.00 =    3350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1455.00 TO NODE   1455.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.952
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.27
  TOTAL AREA(ACRES) =       15.1   TOTAL RUNOFF(CFS) =      20.06
  TC(MIN.) =   14.53

****************************************************************************
  FLOW PROCESS FROM NODE   1455.00 TO NODE   1498.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    71.50
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.78
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.06
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.56
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1498.00 =    3410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1498.00 TO NODE   1498.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.56
  RAINFALL INTENSITY(INCH/HR) =   2.95
  TOTAL STREAM AREA(ACRES) =    15.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.06

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF        Tc       INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      310.63    22.59        2.345        270.00
      2       20.06    14.56        2.949         15.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      267.05    14.56       2.949
      2      326.58    22.59       2.345

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     326.58   Tc(MIN.) =   22.59
  TOTAL AREA(ACRES) =      285.1
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1498.00 =    7355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1498.00 TO NODE   1499.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    71.50
  FLOW LENGTH(FEET) =   570.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  38.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.68
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     326.58
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   22.92
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1499.00 =    7925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1499.00 TO NODE   1499.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1470.00 TO NODE   1471.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
```

```
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE   1471.00 TO NODE   1472.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  100.00  DOWNSTREAM ELEVATION(FEET) =   84.50
  STREET LENGTH(FEET) =   775.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
  STREET FLOW TRAVEL TIME(MIN.) =   5.64   Tc(MIN.) =   10.64
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.379
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.880
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.38
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       2.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   9.78
  FLOW VELOCITY(FEET/SEC.) =  2.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
  LONGEST FLOWPATH FROM NODE   1470.00 TO NODE   1472.00 =    1345.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1472.00 TO NODE   1472.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.379
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8800
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.89
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       3.57
  TC(MIN.) =   10.64

****************************************************************************
  FLOW PROCESS FROM NODE   1472.00 TO NODE   1474.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.50
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.67
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.57
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.83
  LONGEST FLOWPATH FROM NODE   1470.00 TO NODE   1474.00 =    1420.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1474.00 TO NODE   1474.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.359
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8800
  SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    4.14
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       7.68
  TC(MIN.) =   10.83

****************************************************************************
  FLOW PROCESS FROM NODE   1474.00 TO NODE   1475.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    90.20
  FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.68
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   11.83
```

```
 LONGEST FLOWPATH FROM NODE   1470.00 TO NODE   1475.00 =    1910.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1475.00 TO NODE   1475.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.249
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8800
 SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    2.86
 TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =      10.29
 TC(MIN.) =   11.83

****************************************************************************
 FLOW PROCESS FROM NODE   1475.00 TO NODE   1475.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    80.75
 FLOW LENGTH(FEET) =   385.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.38
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.29
 PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   12.35
 LONGEST FLOWPATH FROM NODE   1470.00 TO NODE   1475.50 =    2295.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1475.50 TO NODE   1475.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.35
 RAINFALL INTENSITY(INCH/HR) =   3.19
 TOTAL STREAM AREA(ACRES) =     3.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.29

****************************************************************************
 FLOW PROCESS FROM NODE    398.00 TO NODE   1475.50 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
```

```
  TC(MIN) =  11.85   RAIN INTENSITY(INCH/HOUR) =  3.25
  TOTAL AREA(ACRES) =    29.70   TOTAL RUNOFF(CFS) =     79.44

****************************************************************************
  FLOW PROCESS FROM NODE   1475.50 TO NODE   1475.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.85
  RAINFALL INTENSITY(INCH/HR) =   3.25
  TOTAL STREAM AREA(ACRES) =    29.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     79.44

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.29    12.35        3.192          3.60
      2       79.44    11.85        3.247         29.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       89.32    11.85       3.247
      2       88.39    12.35       3.192

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      89.32   Tc(MIN.) =   11.85
  TOTAL AREA(ACRES) =       33.3
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1475.50 =    3410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1475.50 TO NODE   1476.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    92.50
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.01
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      89.32
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.97
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1476.00 =    3560.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1476.00 TO NODE   1476.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.233
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8310
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    1.99
  TOTAL AREA(ACRES) =       34.0   TOTAL RUNOFF(CFS) =      91.35
  TC(MIN.) =   11.97

****************************************************************************
  FLOW PROCESS FROM NODE   1476.00 TO NODE   1476.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.97
  RAINFALL INTENSITY(INCH/HR) =   3.23
  TOTAL STREAM AREA(ACRES) =    34.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     91.35

****************************************************************************
  FLOW PROCESS FROM NODE    399.00 TO NODE   1476.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.31   RAIN INTENSITY(INCH/HOUR) =  3.42
  TOTAL AREA(ACRES) =     7.20   TOTAL RUNOFF(CFS) =     19.81

****************************************************************************
  FLOW PROCESS FROM NODE   1476.10 TO NODE   1476.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.416
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8146
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    3.01
  TOTAL AREA(ACRES) =        8.2   TOTAL RUNOFF(CFS) =      22.82
  TC(MIN.) =   10.31
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1476.10 TO NODE   1476.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.50
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.63
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.82
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   10.35
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1476.00 =    3435.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1476.00 TO NODE   1476.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.35
  RAINFALL INTENSITY(INCH/HR) =   3.41
  TOTAL STREAM AREA(ACRES) =     8.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.82

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       91.35    11.97        3.233         34.00
      2       22.82    10.35        3.412          8.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      109.40    10.35       3.412
      2      112.98    11.97       3.233

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     112.98   Tc(MIN.) =   11.97
  TOTAL AREA(ACRES) =       42.2
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1476.00 =    3560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1476.00 TO NODE   1477.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    80.00
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.27
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     112.98
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1477.00 =    3960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1477.00 TO NODE   1477.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.200
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8289
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.53
  TOTAL AREA(ACRES) =       43.1   TOTAL RUNOFF(CFS) =     114.34
  TC(MIN.) =   12.27

****************************************************************************
  FLOW PROCESS FROM NODE   1477.00 TO NODE   1478.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    77.50
  FLOW LENGTH(FEET) =   450.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.32
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     114.34
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.60
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1478.00 =    4410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1478.00 TO NODE   1478.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.164
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8296
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.67
  TOTAL AREA(ACRES) =       43.7   TOTAL RUNOFF(CFS) =     114.69
  TC(MIN.) =   12.60

****************************************************************************
  FLOW PROCESS FROM NODE   1478.00 TO NODE   1479.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    76.25
  FLOW LENGTH(FEET) =   475.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.33
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     114.69
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.96
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1479.00 =    4885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1479.00 TO NODE   1479.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.125
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8302
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.37
  TOTAL AREA(ACRES) =       44.2   TOTAL RUNOFF(CFS) =     114.69
  TC(MIN.) =   12.96
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1479.00 TO NODE   1480.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    76.25
  FLOW LENGTH(FEET) =   475.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.33
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     114.69
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   13.31
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1480.00 =    5360.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1480.00 TO NODE   1480.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.086
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8307
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.36
  TOTAL AREA(ACRES) =       44.7   TOTAL RUNOFF(CFS) =     114.69
  TC(MIN.) =   13.31
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1480.00 TO NODE   1481.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    76.25
  FLOW LENGTH(FEET) =   475.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.33
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     114.69
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   13.67
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1481.00 =    5835.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1481.00 TO NODE   1481.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.047
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8313
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.34
  TOTAL AREA(ACRES) =       45.2   TOTAL RUNOFF(CFS) =     114.69
  TC(MIN.) =   13.67
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1481.00 TO NODE   1482.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    76.25
  FLOW LENGTH(FEET) =   475.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.33
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     114.69
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   14.02
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1482.00 =    6310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1482.00 TO NODE   1482.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.008
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8318
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.32
  TOTAL AREA(ACRES) =       45.7   TOTAL RUNOFF(CFS) =     114.69
  TC(MIN.) =   14.02
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1482.00 TO NODE   1483.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    76.00
  FLOW LENGTH(FEET) =   480.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.33
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     114.69
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   14.38
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1483.00 =    6790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1483.00 TO NODE   1483.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.968
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8323
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.31
  TOTAL AREA(ACRES) =       46.2   TOTAL RUNOFF(CFS) =     114.69
  TC(MIN.) =   14.38
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1483.00 TO NODE   1484.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    82.50
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.33
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     114.69
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   14.64
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1484.00 =    7140.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1484.00 TO NODE   1484.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.939
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8325
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.52
  TOTAL AREA(ACRES) =       46.4   TOTAL RUNOFF(CFS) =     114.69
  TC(MIN.) =   14.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1484.00 TO NODE   1485.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    87.50
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.33
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     114.69
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   14.83
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1485.00 =    7390.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1485.00 TO NODE   1485.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.919
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8329
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.03
  TOTAL AREA(ACRES) =       46.8   TOTAL RUNOFF(CFS) =     114.69
  TC(MIN.) =   14.83
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1485.00 TO NODE   1495.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    100.00  DOWNSTREAM(FEET) =     95.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.0167
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.840
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     115.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.46
  AVERAGE FLOW DEPTH(FEET) =   1.37   TRAVEL TIME(MIN.) =   0.92
  Tc(MIN.) =   15.74
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    2.30
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.819
  TOTAL AREA(ACRES) =       48.6         PEAK FLOW RATE(CFS) =     114.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.36   FLOW VELOCITY(FEET/SEC.) =   5.45
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1495.00 =    7690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1495.00 TO NODE   1495.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.74
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.84
  TOTAL STREAM AREA(ACRES) =    48.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    114.69

****************************************************************************
  FLOW PROCESS FROM NODE   1490.00 TO NODE   1490.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.400
  SUBAREA RUNOFF(CFS) =      1.55
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.55

****************************************************************************
  FLOW PROCESS FROM NODE   1490.00 TO NODE   1491.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    97.50
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.55
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    5.11
  LONGEST FLOWPATH FROM NODE   1490.00 TO NODE   1491.00 =     350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1491.00 TO NODE   1491.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.378
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8800
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.77
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.31
  TC(MIN.) =    5.11

****************************************************************************
  FLOW PROCESS FROM NODE   1491.00 TO NODE   1495.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    93.75
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.31
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    5.37
  LONGEST FLOWPATH FROM NODE   1490.00 TO NODE   1495.00 =     475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1495.00 TO NODE   1495.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.37
  RAINFALL INTENSITY(INCH/HR) =   4.33
  TOTAL STREAM AREA(ACRES) =     0.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.31

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      114.69    15.74        2.840         48.60
      2        2.31     5.37        4.330          0.60

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       77.55     5.37       4.330
      2      116.20    15.74       2.840

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     116.20   Tc(MIN.) =   15.74
  TOTAL AREA(ACRES) =       49.2
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1495.00 =    7690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1495.00 TO NODE   1496.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    99.60
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.20
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     116.20
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   15.80
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1496.00 =    7730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1496.00 TO NODE   1496.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.836
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7963
  SUBAREA AREA(ACRES) =    3.30   SUBAREA RUNOFF(CFS) =    4.21
  TOTAL AREA(ACRES) =       52.5   TOTAL RUNOFF(CFS) =     118.56
  TC(MIN.) =   15.80

****************************************************************************
  FLOW PROCESS FROM NODE   1496.00 TO NODE   1499.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    98.35
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.24
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     118.56
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   16.02
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1499.00 =    7895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1499.00 TO NODE   1499.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      118.56    16.02       2.818       52.50
```

```
  LONGEST FLOWPATH FROM NODE   1450.00 TO NODE   1499.00 =    7895.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
      1      326.58    22.92       2.325      285.10
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1499.00 =    7925.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     346.89      16.02        2.818
      2     424.39      22.92        2.325

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     424.39   Tc(MIN.) =   22.92
  TOTAL AREA(ACRES) =      337.6

****************************************************************************
  FLOW PROCESS FROM NODE   1499.00 TO NODE   1499.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.325
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5337
  SUBAREA AREA(ACRES) =    8.50   SUBAREA RUNOFF(CFS) =    8.89
  TOTAL AREA(ACRES) =      346.1   TOTAL RUNOFF(CFS) =     429.44
  TC(MIN.) =   22.92
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      346.1  TC(MIN.) =     22.92
  PEAK FLOW RATE(CFS)   =     429.44
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C

Conceptual Water Quality and Hydromodification Management BMP Sizing (General BMP Sizing)

Geomorphic Channel Assessment (BMP 14 and Outfall 9)

Otay Mesa Southwest Village
J-15013C
4/20/2023

Specific Plan - Conceptual Water Quality Calculations

Pollutant Control (Structural) BMP Calculations

General Note: The following conceptual HMP calculations are based on the typical sizing ratio from our past experience.
During the preliminary/final engineering of this project, detailed continuous simulation model will be required to determine HMP volume.

												Rough HMP Sizing [1]	
Major Drainage Basin	**Basin / TC-BMP ID**	**Tributary Area (acres)**	**% Impervious**	**Impervious DMA (ft^2)**	**Pervious DMA (ft^2)**	**Runoff Factor for Impervious DMA**	**Runoff Factor for Pervious DMA**	**Effective Impervious Area (ft^2)**	**24-hour, 85th Rainfall Depth, P_{85} (ft)**	**Minimum Design Capture Volume (DCV) (ft^3)**	**Minimum WQ Surface Area (per biofiltration BMP) [2] (ft^2)**	**Assumed Low Flow Threshold**	**Minimum HMP Volume (ft^3)**
Spring Canyon	6	67.0	80%	2,334,816	583,704	1.0	0.1	2,393,186	0.46	91,739	71,796	$0.1Q_1$	183,478
	9	53.0	80%	1,846,944	461,736	1.0	0.1	1,893,118	0.46	72,570	56,794	$0.1Q_2$	145,139
	10	20.0	80%	696,960	174,240	1.0	0.1	714,384	0.46	27,385	21,432	$0.1Q_2$	54,769
	11	14.8	80%	515,750	128,938	1.0	0.1	528,644	0.46	20,265	15,859	$0.1Q_2$	40,529
	12	25.0	80%	871,200	217,800	1.0	0.1	892,980	0.46	34,231	26,789	$0.1Q_2$	68,462
	13	16.2	80%	564,538	141,134	1.0	0.1	578,651	0.46	22,182	17,360	$0.1Q_2$	44,363
Moody Canyon	1	6.0	75%	196,020	65,340	1.0	0.1	202,554	0.46	7,765	6,077	$0.1Q_2$	15,529
	2	60.7	70%	1,850,864	793,228	1.0	0.1	1,930,187	0.46	73,991	57,906	$0.1Q_2$	147,981
	3	37.0	75%	1,208,790	402,930	1.0	0.1	1,249,083	0.46	47,882	37,472	$0.1Q_2$	95,763
	14	15.5	85%	573,903	101,277	1.0	0.1	584,031	0.46	22,388	17,521	$0.1Q_3$	44,776
	TOTAL	**315.2**								**420,395**	**329,005**		**840,789**

NOTE:

1. The rough HMP sizing was performed assuming a low flow threshold of $0.1Q_2$. The typical sizing ratio (acre-feet/acre) is based on our past experience from other projects. For preliminary purposes, it was assumed that the minimum required HMP volume will be equal to two times the Design Capture Volume (2 x DCV).
2. If biofiltration BMPs were selected for future planning area's pollutant control, the biofitlration BMP footprint is approximately 3% of the effective impervious area.

March 8, 2022

City of San Diego
Development Services
101 Ash Street
San Diego, California 92101

SUBJECT: THRESHOLD CHANNEL ASSESSMENT FOR SOUTHWEST VILLAGE (RICK ENGINEERING COMPANY JOB NUMBER 15013-C)

This letter is being prepared in support of a Threshold Channel Analysis (or Geomorphic Channel Analysis) for the Southwest Village project located in Otay Mesa. Two locations have been considered for analysis and have concluded that using $0.5Q_2$ as the low-flow threshold is acceptable:

1) The outfall into the Tijuana River Estuary from which the project conveys flows via proposed and existing hardened systems (storm drain, culverts and open channels)
2) Project Outfall 9 which discharges into Spring Canyon just upstream of the international border with Mexico.

Appendix H.7.2 in the City of San Diego Stormwater Standards Manual, dated May 2021, details the requirements for threshold channel analysis and defines a threshold channel as,

> *A stream channel in which channel boundary material has no significant movement during the design flow. If there is no movement of bed load in the stream channel, then it is not anticipated that reductions in sediment supply will be detrimental to stream stability because the channel bed consists of the parent material and not coarse sediment supplied from upstream. In such a situation, changes in sediment supply are not considered a geomorphic condition of concern.*

Furthermore this section in the appendix continues by defining the domain of analysis (or area of study) that is required to be considered before a new low-flow threshold can be considered for the channel.

- From the point of compliance (POC) proceed downstream until reaching one of the following:
  - At least one reach downstream of the first grade-control point (preferably second downstream grade control location);
  - Tidal backwater/lentic (still water) waterbody;
  - Equal order tributary (Strahler 1952);
  - A 2-fold increase in drainage area.

OR demonstrate sufficient flow attenuation through existing hydrologic modeling.

- From the point of compliance proceed upstream for 20 channel top widths OR to the first grade control in good condition, whichever comes first.

Worksheet H.7-1 has been provided here for both outfall locations as a means to document the selection of the domain of analysis, as well as an exhibit of the flow path from the project site to the downstream system where one of the threshold criteria is met.

Please feel free to contact Eric Hengesbaugh or myself if you have any questions and/or concerns at (619) 291-0707.

Sincerely,

RICK ENGINEERING COMPANY

Brendan Hastie, P.E.
R.C.E. #65809, Exp. 9/21
Principal

Attachments

1. Worksheet H.7-1 Beyer BMP
2. Exhibit Beyer BMP
3. SD As-Builts
4. Site Visit Photos for Beyer
5. Worksheet H.7-1 Outfall 9
6. Exhibit Outfall 9
7. Site Visit photos for Outfall 9

Worksheet H.7-1: Domain of Analysis

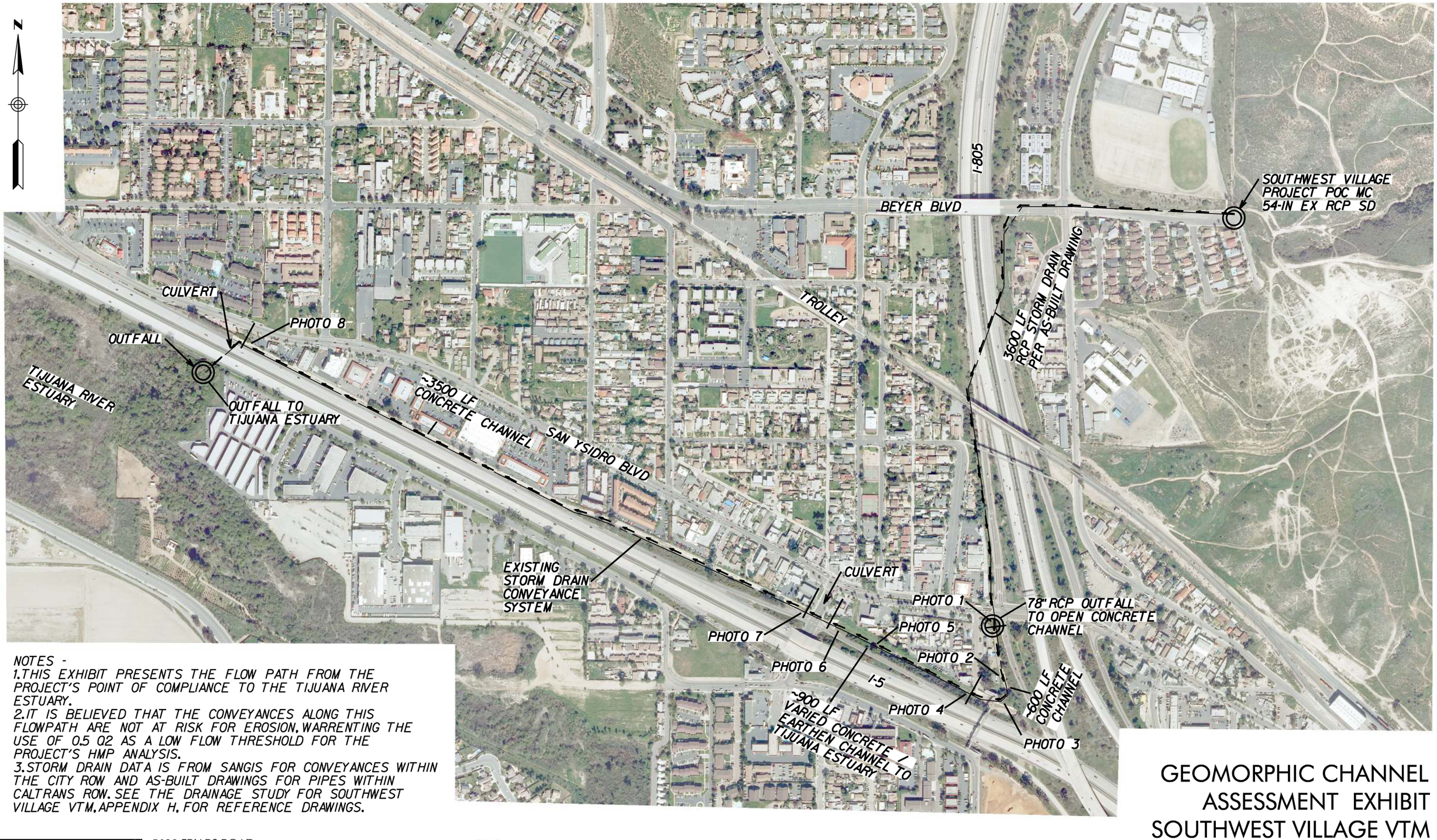
Domain of Analysis		Worksheet H.7-1
Use this form to document the domain of analysis		
Project Name: Southwest Village Vesting Tentative Map		
Project Tracking Number / Permit Application Number: 614791		
Part 1: Identify Domain of Analysis		
Project Location (at proposed stormwater discharge point)		
1	Address:	
2	Latitude (decimal degrees):	32°33'20.38"N
3	Longitude (decimal degrees):	117° 3'22.57"W
4	Watershed:	Tijuana River
Basis for determining downstream limit: The Tijuana River Estuary is know primarily for sedimentation rather than erosion.		
Channel length from discharge point to downstream limit:		1.500-ft
Basis for determining upstream limit: The Tijuana River Estuary is know primarily for sedimentation rather than erosion.		
Channel length from discharge point to upstream limit:		0-ft

Worksheet H.7-1; Page 2 of 2

Photo(s)

Map or aerial photo of site. Include channel alignment and tributaries, project discharge point, upstream and downstream limits of analysis, ID number and boundaries of geomorphic channel units, and any other features used to determine limits (e.g. exempt water body, grade control).

See the exhibit attached on the following page that defines the flow path from the project site through hardened channel and ultimately a discharge point into the Tijuana River Estuary. The Tijuana River Estuary is know primarily for sedimentation rather than erosion.



NOTES -
1. THIS EXHIBIT PRESENTS THE FLOW PATH FROM THE PROJECT'S POINT OF COMPLIANCE TO THE TIJUANA RIVER ESTUARY.
2. IT IS BELIEVED THAT THE CONVEYANCES ALONG THIS FLOWPATH ARE NOT AT RISK FOR EROSION. WARRENTING THE USE OF 0.5 Q2 AS A LOW FLOW THRESHOLD FOR THE PROJECT'S HMP ANALYSIS.
3. STORM DRAIN DATA IS FROM SANGIS FOR CONVEYANCES WITHIN THE CITY ROW AND AS-BUILT DRAWINGS FOR PIPES WITHIN CALTRANS ROW. SEE THE DRAINAGE STUDY FOR SOUTHWEST VILLAGE VTM, APPENDIX H, FOR REFERENCE DRAWINGS.

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-15013-C

500 250 0 500 1000 1500

GRAPHIC SCALE 1" = 500'

GEOMORPHIC CHANNEL ASSESSMENT EXHIBIT SOUTHWEST VILLAGE VTM

December 16, 2022

J-15013-C

I-805-1(82)1

DIST	COUNTY	ROUTE	POST MILE	TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	805	0.5-3.7		1	385
	SD	75	4.6-5.4			

STATE OF CALIFORNIA
BUSINESS AND TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

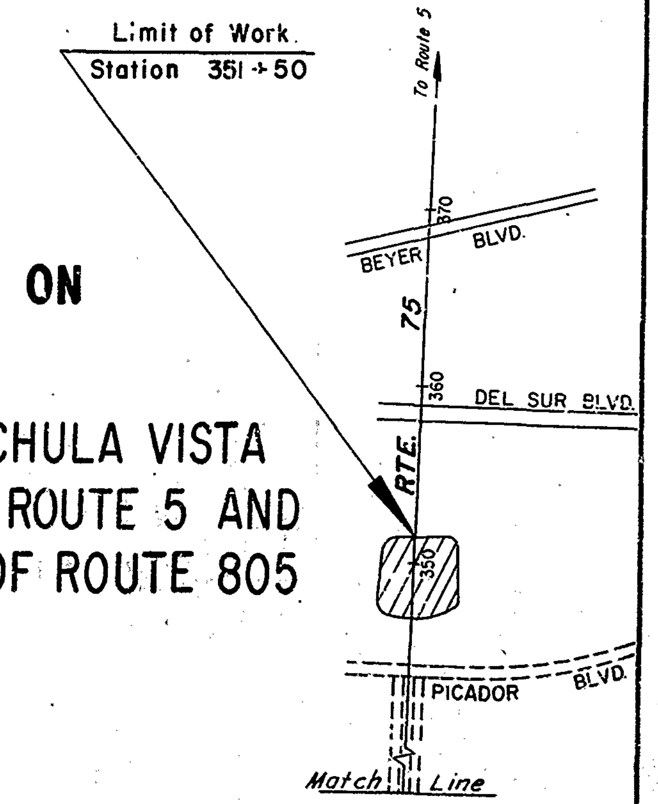
PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY

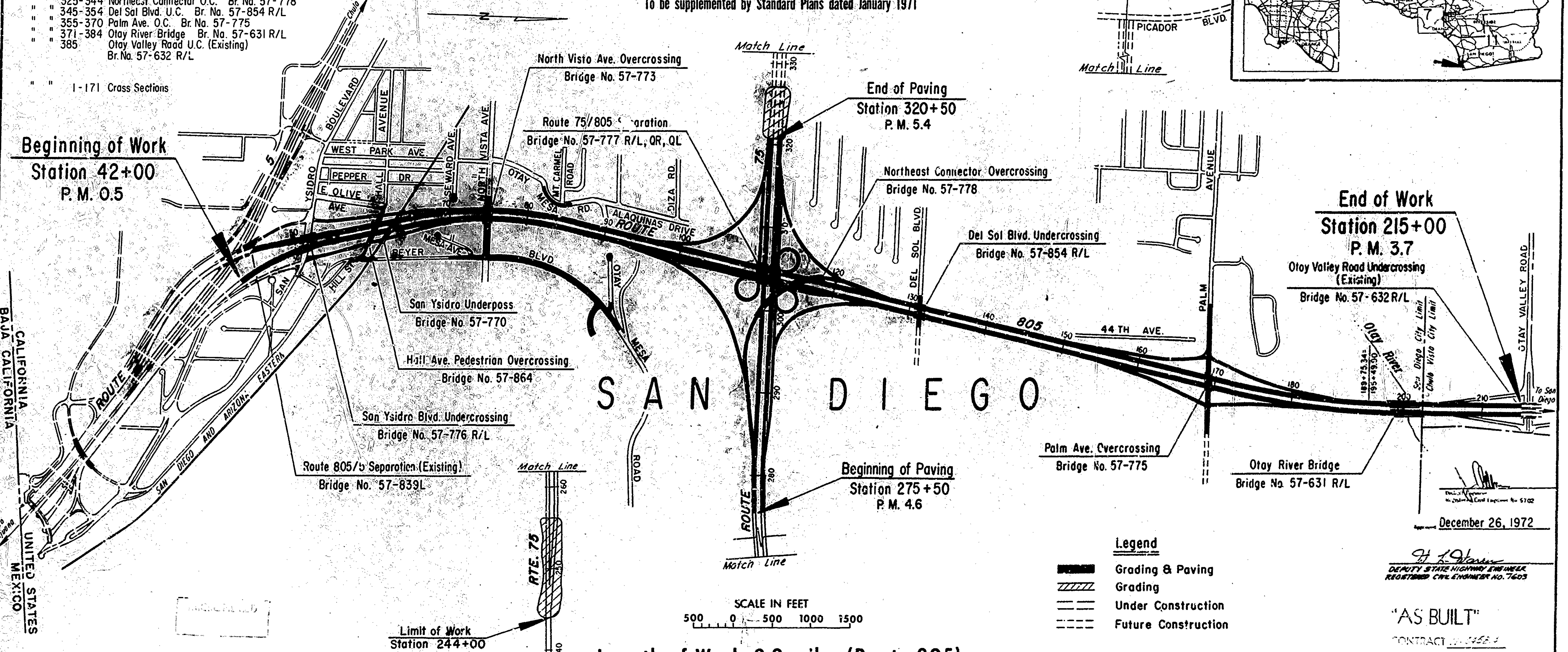
IN SAN DIEGO COUNTY IN AND NEAR SAN DIEGO AND CHULA VISTA ON ROUTE 805 FROM ROUTE 5 TO 3.2 MILES NORTH OF ROUTE 5 AND ON ROUTE 75 FROM 0.5 MILE EAST TO 0.3 MILE WEST OF ROUTE 805

To be supplemented by Standard Plans dated January 1971

INDEX OF SHEETS

BRIDGE PLANS





SCALE IN FEET
500 0 500 1000 1500

Legend
- Grading & Paving
- Grading
- Under Construction
- Future Construction

Length of Work-3.2 miles (Route 805).
Length of Work-0.8 miles (Route 75)

December 26, 1972

DEPUTY STATE HIGHWAY ENGINEER
REGISTERED CIVIL ENGINEER NO. 7603

"AS BUILT"
CONTRACT
DATE COMPLETED

Project Engineer	Date	Design Engineer	Date	Approval Recommended by	Date
T.R. VASQUEZ	3/72	R.H. CLARK	3/72	J.G. GRASBERGER	3/72

Drawn by	Date
Checked by	Date

The detailed plans are a portion of the route for the State Highway adopted by the California Highway Commission on September 27, 1960 and June 29, 1965 and declared a FREEWAY by resolution of the California Highway Commission on September 27, 1960 and June 29, 1965.

AS BUILT PLANS
Contract No. 11-045814
Date Completed
Document No.

Contract No. 11-045814

11201 045811 1

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	805-75	0.5/37.4-6.5A	16	395

R.D. Clark
DISTRICT DESIGN ENGINEER — REGISTERED CIVIL ENGINEER

DATE APPROVED December 26, 1972

Outfall to concrete channel

SEE SHEET 2

"AS BUILT"
CONTRACT NOT ACCEPTED
NOT COMPLETED

CONTOUR GRADING & DRAINAGE

(48) (51) (52) (53) (67) SHEET 1 OF 16 SHEETS

Project Engineer	Date	Design Engineer	Date	Approval Recommended By	Date

MICROFILMED

AS BUILT PLANS
Contract No. 11-065414
Date Completed 7-5-73
Document No. 4006281

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

DATE 7/5/73 SIGNATURE [illegible] TITLE [illegible]

REV. LT. 6/19/72

FORM WH12A-PF

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

DIST	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	805-75	05/37.-46/5.447		385

R.D. Clark
DISTRICT DESIGN ENGINEER — REGISTERED CIVIL ENGINEER
DATE APPROVED December 26, 1972

Note: Omit slope rounding Lt. side Sta 70 to 73

Note Omit slope rounding Rt. side Sta. 61 to 71

Remove Wall

Obliterate Road

Obliterate Rd.

Revised Grading GDO 27 Rev. 1

Hinge Line

Beg. 0.50 Cement Treatment Ditch to Wide

"S" Dike

"A" Dike

Beg. "A" Dike

Beg. Dike

Sewer Easement

Grading Easement

Ramp w/ Guard Rail

MESA AVENUE

SEE SHEET 1

SEE SHEET 3

SEE SHEET 4

"AS BUILT"
CONTRACT 11-05814
YEAR COMPLETED 72

CONTOUR GRADING & DRAINAGE

(60) (67) (71) (93) SHEET 2 OF 16 SHEETS

Project Engineer	Date	Design Engineer	Date	Approval Recommended By	Date

REV. DTE. 6/19/72

FORM WH23A-PF

AS BUILT PLANS
Contract No. 11-05814
Date Completed 7-5-72
Document No. 4000628L

MICROFILMED JUL 26 1972

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

DATE 7/26/72 SIGNATURE [illegible] TITLE [illegible]

SCALE 1"= 50' MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

SCALE 1"= 10' or 1"= 100' MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION-MICROFILM

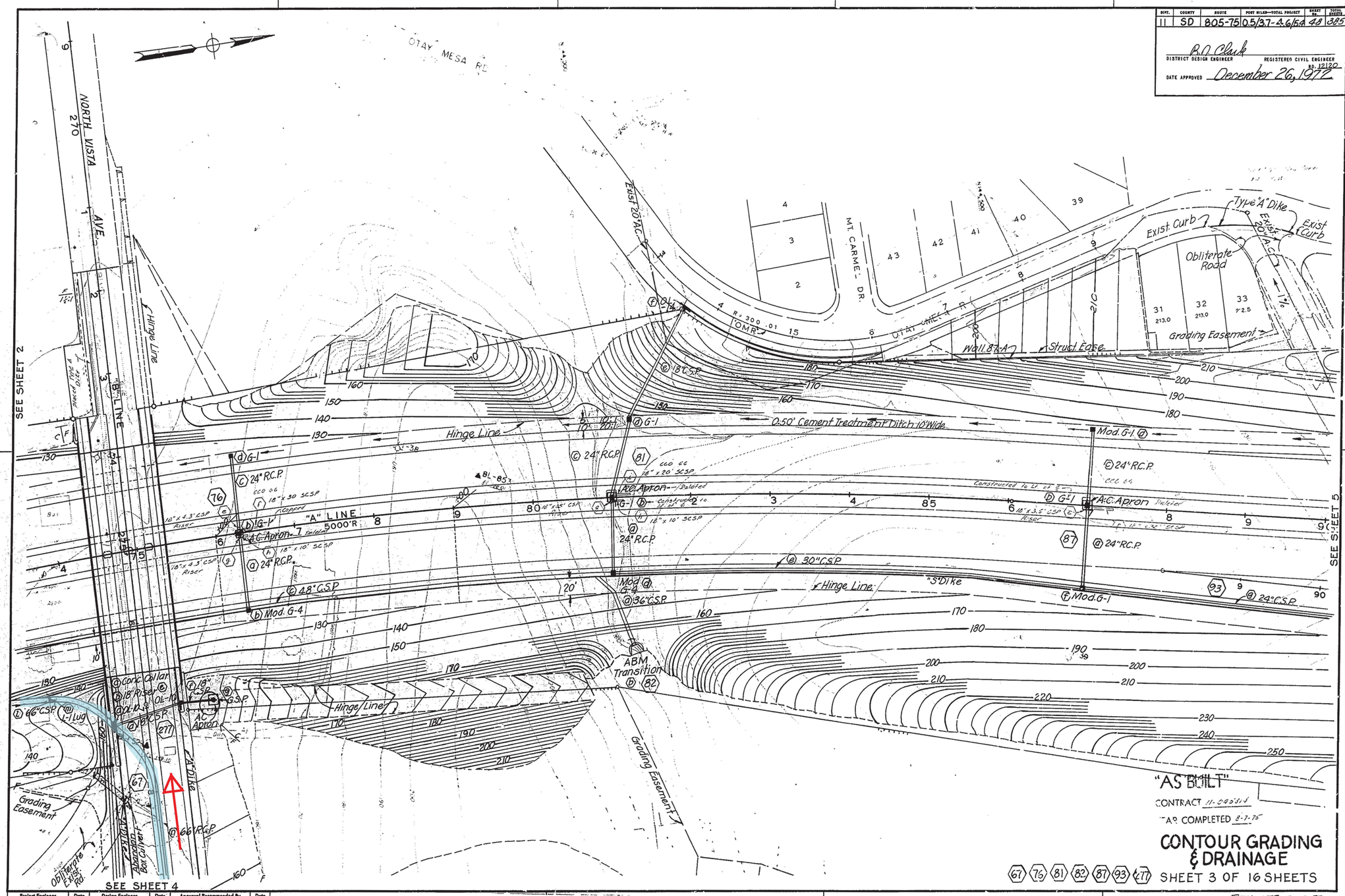
SCALE 1"= 20' MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

SCALE 1"= 40' MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION-MICROFILM

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	805-75	0.5/3.7-4.6/5.4	48	385

R.O. Clark
DISTRICT DESIGN ENGINEER — REGISTERED CIVIL ENGINEER R.E. 12120

DATE APPROVED December 26, 1972



"AS BUILT"
CONTRACT 11-045814
"AS" COMPLETED 8-7-75

CONTOUR GRADING & DRAINAGE

67 76 81 82 87 93 277 SHEET 3 OF 16 SHEETS

Project Engineer	Date	Design Engineer	Date	Approval Recommended By	Date

48

47 REV. LTR. 6-13-72.

FORM WH23A-PF

MICROFILM JUL 26 '76

AS BUILT PLANS
Contract No. 11-045814
Date Completed 7-9-76
Document No. A000628I

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

DATE 7/26/76 SIGNATURE [illegible] TITLE [illegible]

DAS-55-78

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	805-75	05/37.4-46/54.4	49	385

R. D. Clark
DISTRICT DESIGN ENGINEER — REGISTERED CIVIL ENGINEER NO. 12120

DATE APPROVED December 26, 1972

SEE SHEET 3

SEE SHEET 2

Otay Mesa Rd

Beyer Blvd

Hinge Line

"A" Dike

Drainage Easement

Slope Easement

Match Line

Edge Shld.

Profile Ground

SECTION "B-B"
Scale 1"=10'

Asph. Existing Rd.

End Dike

Obliterate Rd

Place Smaller Rocks upstream
No Cutoff

El. Top Rock 156.0
1.5'
El. 152.5

SECTION "A-A" (67) (0)
SCALE 1"=10'

½ Ton Rock Ditch Check
20' Rt. Sta 281+30 "B"
P.M. 0.0-3.4

Note: Upstream of ditch check leave Channel in its natural condition & Protect Vegetation during Construction

AS BUILT PLANS
Contract No. 11-045814
Date Completed 7-9-75
Document No. A000628[illegible]

"AS BUILT"
CONTRACT 11-045814
YEAR COMPLETED 1975

CONTOUR GRADING & DRAINAGE

(21) (27) (67) SHEET 4 OF 16 SHEETS

Project Engineer	Date	Design Engineer	Date	Approval Recommended By	Date

MICROFILMED AUG 6 1976

49

48

FORM WH23A-PF

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

DATE 7/26/76 SIGNATURE [illegible] TITLE [illegible]

DAS-55-78

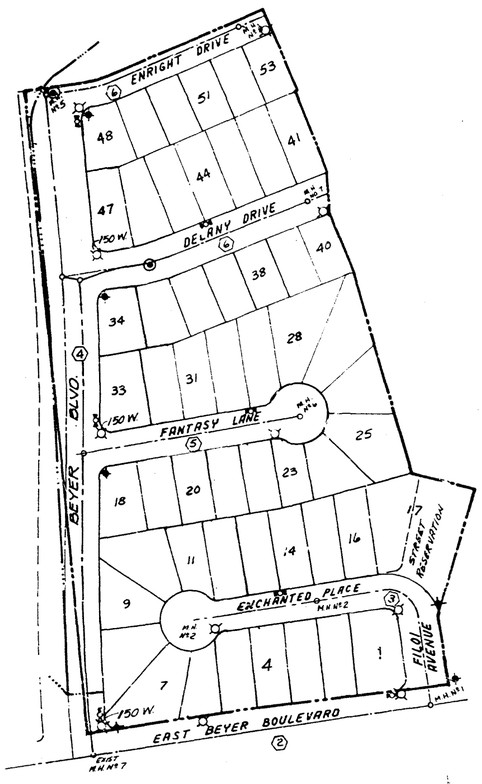
MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

GENERAL NOTES

1. WHERE NEW UNDERGROUND CONNECTS TO EXISTING WORK IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE LOCATIONS AND ELEVATION OF EXISTING WORK PRIOR TO EXCAVATION FOR NEW WORK AND TO CONNECT THE NEW WORK THERETO.
2. PRIOR TO MIXING WITH CEMENT AND WATER, ALL MINERAL AGGREGATE USED FOR THE PRODUCTION OF CEMENT TREATED BASE SHALL HAVE A SAND EQUIVALENT OF NOT LESS THAN 30, WHEN TESTED BY CALIFORNIA DIVISION OF HIGHWAYS TEST METHOD NUMBER CALIFORNIA 217.
3. CONTRACTORS MAKING ANY TYPE OF EXCAVATION ON THIS PROJECT AFTER ROUGH GRADE AND PRIOR TO FINISH GRADE SHALL REMOVE FROM THE SITE OR TO AREA DESIGNATED BY ENGINEER OF WORK, ALL EXCAVATION MATERIAL EXCEPT THAT USED AS COMPACTED BACKFILL IN SUCH EXCAVATION.
4. THE CONTRACTOR SHALL VERIFY THE LOCATION OF AND PROTECT ALL EXISTING IMPROVEMENTS BEFORE AND DURING CONSTRUCTION.
5. TOP OF STORM DRAIN BOXES SHALL BE CONSTRUCTED CONCURRENT WITH ADJOINING CURBS AND GUTTERS.
6. ALL STRUCTURES IN STREET RIGHT OF WAY SHALL BE KEPT AT LEAST 12" BELOW FINISH GRADE UNTIL CURBS, SIDEWALK AND PAVEMENT ARE INSTALLED AND SHALL THEN BE ADJUSTED TO FINISH GRADE.
7. PROVIDE ADEQUATE PROTECTION - CRASH POST, TYPE "G" CURB - PEDESTAL, FOR FIRE HYDRANTS IN ROLLED CURB AREAS - SEE DETAIL. FLANGE SHALL BE ABOVE PEDESTAL.
8. ENGINEER'S GRADE STAKES SHALL BE PROVIDED ON PARTIAL UNDERGROUND SHEETS BEFORE PAVING BEGINS.
9. ELECTRICAL & TELEPHONE SERVICE FACILITIES SHALL BE INSTALLED UNDERGROUND IN ACCORDANCE WITH SECTION 102.0404 OF THE MUNICIPAL CODE AND SUBDIVISION BOARD RESOLUTION NO. 264. THERE ARE EXISTING 12 KVA OVERHEAD LINES ALONG WESTERN EDGE THIS SUBDIVISION TO BE UNDERGROUNDED.
10. ALL UNDERGROUND UTILITIES & LATERALS TO BE INSTALLED BEFORE CONSTRUCTION OF CURBS OR CONCRETE
11. CROSS-GUTTERS OR SURFACING OF STREETS.
CONTRACTOR SHALL VERIFY LOCATIONS OF DRIVEWAYS AND SHALL CONSTRUCT DRIVEWAY DEPRESSION CONCURRENT WITH CURB CONSTRUCTION FOR EACH LOT. STANDARD DRAWING NUMBERS G-14, G-16, G-15

WATER AND SEWER NOTES

1. THE WATER AND SEWER FACILITIES SHOWN ON THESE PLANS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE WATER UTILITIES DIRECTOR.
2. EACH BUILDING SHALL RECEIVE A 1-INCH WATER SERVICE AND 4-INCH SEWER HOUSE CONNECTION. LOCATION TO BE DETERMINED IN THE FIELD BY THE ENGINEER OF WORK. THE "AS BUILT" LOCATIONS SHALL BE SHOWN ON THESE PLANS AND THE SEWER LATERAL TABLE COMPLETED PRIOR TO ACCEPTANCE OF THE WATER AND SEWER FACILITIES.
3. WATER SERVICES, SEWER LATERALS AND FIRE HYDRANT SERVICES ARE TO BE INSTALLED IN ACCORDANCE WITH THE STANDARD DRAWINGS. THE LOCATION OF WATER AND SEWER FACILITIES SHOWN ON THESE PLANS SHALL TAKE PRECEDENCE IN CASE OF CONFLICTS WITH OTHER UTILITIES NOT SHOWN HEREON.
4. SUBSTITUTION OF MATERIALS FOR CONSTRUCTION OF WATER AND SEWER FACILITIES WILL NOT BE ALLOWED UNLESS APPROVED BY THE WATER UTILITIES DIRECTOR.
5. LOCATE WATER SERVICES AND SEWER HOUSE CONNECTIONS OUT OF DRIVEWAYS. THE SEWER HOUSE CONNECTION SHALL BE A MINIMUM 5' DISTANCE DOWNSTREAM FROM THE WATER SERVICE.
6. WHERE SEWER LATERALS CROSS THE CURB LINE, A LETTER "S" SHALL BE STAMPED OR CHISELED IN THE CURB FACE (1-1/2-INCHES HIGH AND 3/16-INCHES DEEP).
7. COVER OVER WATER MAIN IS TO BE 3' UNLESS OTHER IS CALLED OUT. IF OVER 5' OF COVER AND LESS THAN 2.5', A.C. MAIN IS NOT ACCEPTABLE.
8. SEWER LATERALS ARE TO BE SPACED SO THERE IS ONLY ONE CONNECTION IN ANY ONE PIPE LENGTH. DOUBLE WYES ARE NOT TO BE USED.
9. OPEN ENDS OF ALL SEWER MAINS AND SEWER LATERALS SHALL BE PLUGGED WITH P.V.C. PLUGS.
10. ALL LATERALS WITH LESS THAN 4-FOOT COVER TO INVERT BE CONCRETE ENCASED.
11. ALL SEWER MAINS AND LATERALS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CURRENT SEWER AGENCY AND STREET AGENCY STANDARDS FOR SEWER CONSTRUCTION AND SAID STANDARDS WILL GOVERN ALL SEWER TRENCH BACKFILL.
12. SUBSTITUTION OF MATERIALS FOR CONSTRUCTION OF WATER AND SEWER FACILITIES SHALL NOT BE ALLOWED UNLESS APPROVED BY THE WATER UTILITIES DIRECTOR.
13. ALL WATER MAINS SHALL BE CLASS 150 UNLESS OTHERWISE NOTED.
14. ALL MANHOLE COVERS, GATE VALVE COVERS AND STREET MONUMENTS SHALL BE ADJUSTED TO FINISH GRADE. (NEW OR EXISTING).
15. PRESSURE REGULATORS REQUIRED ON WATER SERVICES.
16. BYPASS REQUIRED ON 12" AND 16" GATE VALVES.



SCALE 1" = 100'

		A.D.T.	
⊕ INDICATES CONTROL MONUMENTS	BEYER BOULEVARD	20,000	4" A.C. ON 10" C.T.B.
▣ INDICATES STREET NAME SIGN	EAST BEYER BOULEVARD	10,000	4" A.C. ON 10½" C.T.B.
FH INDICATES FIRE HYDRANT	ENCHANTED PLACE	CUL-DE-SAC	2" A.C. ON 5" C.T.B.
☐ INDICATES STREET LIGHT SYSTEM	FANTASY LANE	CUL-DE-SAC	2" A.C. ON 5" C.T.B.
INDICATES SEWER MAIN & MANHOLE	FILO AVENUE	CUL-DE-SAC	2" A.C. ON 5" C.T.B.
② INDICATES IMPROVEMENT PLAN SHEET NO.	ENRIGHT DRIVE	LOCAL	2" A.C. ON 5" C.T.B.
INDICATES STORM DRAIN	DELANY DRIVE	2,000	2" A.C. ON 5" C.T.B.

KEY MAP SYMBOLS

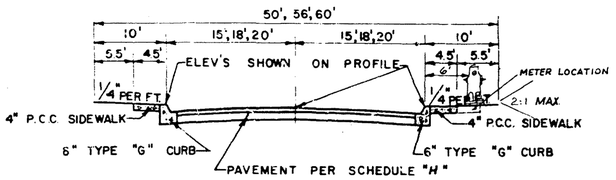
TELEPHONE, GAS & ELECTRIC NOTES

1. NOTICE: ALL TELEPHONE SERVICES WITH THIS SUBDIVISION ARE "UNDERGROUND INSTALLATION". FOR LOCATION OF CABLES AND APPURTENANCES CONTACT THE PACIFIC TELEPHONE & TELEGRAPH CO.
2. NOTICE: ALL ELECTRICAL AND GAS SERVICES WITHIN THIS SUBDIVISION ARE "UNDERGROUND INSTALLATION". FOR LOCATION OF ELECTRICAL CABLES AND GAS PIPING AND APPURTENANCES, CONTACT SAN DIEGO GAS & ELECTRIC COMPANY.

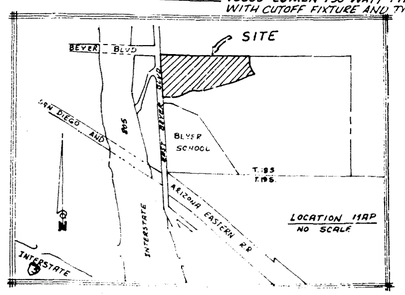
STREET LIGHT NOTES

1. CONTRACTOR INSTALLING THE STREET LIGHTING DISTRIBUTION SYSTEM SHALL NOTIFY FIELD ENGINEER, , PHONE 236-5520 A MINIMUM OF 3 DAYS BEFORE BEGINNING OF WORK FOR APPROVAL OF CONDUIT LOCATION AND REQUIREMENTS.
2. CONTRACTOR SHALL VERIFY ALL STREET LIGHTS ARE BURNING AND NOTIFY FIELD ENGINEER, , PHONE 236-5520 A MINIMUM OF 4 WEEKS AFTER FINAL ELECTRICAL INSPECTION.

8 — 9500 LUMEN 100 WATT TYPE III HIGH PRESSURE SODIUM VAPOR WITH CUTOFF FIXTURE
3 — 16000 LUMEN 150 WATT TYPE III HIGH PRESSURE SODIUM VAPOR WITH CUTOFF FIXTURE AND TYPE XV STEEL STANDARD



ALL INTERIOR TYPICAL STREET SECTION (NOT TO SCALE)



SOILS REPORT

WILLIAM S. KROOSKOS & ASSOCIATES
REPORT DATED JULY 21, 1977
PROJECT NO. 77-5343

STORM DRAIN ALTERNATES

ALTERNATE NO. 1: ASBESTOS CEMENT DRAIN PIPE, SPECIAL PROVISION P-21 SHALL GOVERN. (A.C.P. SHALL BE 2000-D)

ALTERNATE NO. 2 CAST IN PLACE CONCRETE PIPE, SPECIAL PROVISION P-16 SHALL GOVERN.

REFERENCE DRAWINGS

OTAY MESA SEWER AND SAN YSIDRO SCHOOL DISTRICT WATER MAIN DWGS: 16864-1-D, 16864-2-D, AND 16864-3-D.

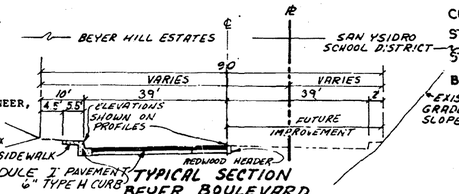
WATER CONNECTIONS

CONNECTION NO. 1 - $2000.00

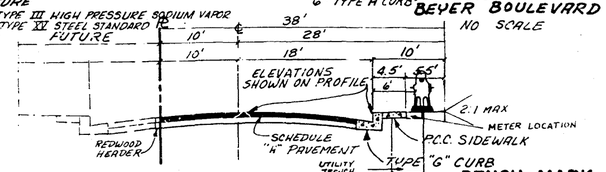
SITE DEVELOPMENT

GRADING - SHEETS 9 & 10
LANDSCAPING - SHEETS 9 & 11
IRRIGATION - SHEETS 9 & 11

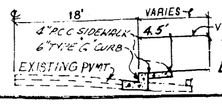
EXCAVATION = 24,500 C.Y.
EMBANKMENT = 150,000 C.Y.
(IMPORT) = 125,500 C.Y.



TYPICAL SECTION
BEYER BOULEVARD
NO SCALE



TYPICAL SECTION
BOUNDARY ENRIGHT DRIVE
NO SCALE



TYPICAL SECTION
EAST BEYER BLVD.
NO SCALE

"AS BUILT"
DATE:

BENCH MARK

CITY OF SAN DIEGO BENCH MARK
SW COR BRIDGE UP FLAT, MONUMENT
BEYER BOULEVARD AND SAN YSIDRO FREEWAY
N-1433, E-17557
ELEV. = 430.553

PRIVATE CONTRACT
ENGINEER OF WORK
ASSOCIATED ENGINEERS
3904 GROTON STREET
SAN DIEGO, CALIF. 92110
PHONE (714) 224-2467
RCE 25900
DATE 20 SEPT. 1978

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

WORK TO BE DONE

The Improvements consist of the following work to be done according to these plans and the Specifications and Standard Drawings of the City of San Diego.

SPECIFICATIONS

(1) Green Book Standard Specifications (1976 Ed.) Document No. 755163 filed May 10, 1976, and
(2) City of San Diego Standard Special Provisions, Document No. 758403, filed February 25, 1977.

STANDARD DRAWINGS

(1) City of San Diego Standard Drawings (1977 Ed.) Document No. 758672 filed March 21, 1977, and
(2) ( )* Denotes City of San Diego Standard Drawing per Document No. 735691, filed April 26, 1971.

IMPROVEMENTS	STD. DWG. NO.	SYMBOL
A.C. PAVEMENT	(G-58)*(G-59-T)*	
TYPE "G" CURB	G-2	
PAVEMENT CUTOFF WALL	G-22	
CROSS GUTTER	G-12	
SIDEWALK	G 7	
PEDESTRIAN RAMP	SDG-101	
A.C. BERM	G-5	6" B-1
CONTROL MONUMENT (3)	(M-21-T)*	
DRIVEWAY	G-14	
2" A.C.		
SEWER MAIN (JOHNS-MANVILLE)	S-4, S-5	8" P.V.C.
SEWER CONCRETE MANHOLE	S-1, M-3 (SEE DETAIL SHT.)	M.H.
4" P.V.C. SEWER HOUSE CONNECTION	S-13	S
CONCRETE CRADLE FOR SEWERS	S-6	
CUT OFF WALL	S-10	
WATER MAIN (TYLER FITTINGS JOHNS-MANVILLE)	W 21, W-17, W-18, W-20	8" A.C.
1" COPPER WATER SERVICE	(W-2)*, W-15-A2, (W-27)*	
GATE VALVE AND BOX W/BYPASS 12" & 16" G.V.: GATE VALVE COVER ONLY	SDW 109, W-19-A, W-12-B, (W-26)* I-27	8"GV
FIRE HYDRANT ASSEMBLY	W-10, W-11-A	F.H.
BLOW-OFF ASSEMBLY	SDW-102	B.O.
MULTI SERVICE FITTING	(W-60)*	
2" AIR VALVE	(W-13)*	2"AV
STORM DRAIN	D-60	
CURB INLET TYPE B, B-1	D-2	
GRAVITY HEADWALL	D-32	
STORM DRAIN CLEAN OUT	D-9, D-10	
CONCRETE LUG	D-63	
WING TYPE HEADWALL	D-35	
CURB OUTLET A & B	D-25	
STREET NAME SIGN	SDM-102, SDM-103	
STREET LIGHT SYSTEM	E-1, E-2, E-4	
BARRICADES AND GUARD POST	M-9	

MAINTAINING TRAFFIC. THE CONTRACTOR SHALL MAINTAIN ONE LANE OF TRAFFIC IN EACH DIRECTION DURING WORKING HOURS OF 8:30 AM TO 3:30 PM AND SHALL MAINTAIN FULL WIDTH OF TRAVEL LANES OF EXISTING ROADWAY DURING THE HOURS OF 3:30 PM AND 8:30 AM. ON SATURDAY, SUNDAY, AND DESIGNATED LEGAL HOLIDAYS, AND WHEN CONSTRUCTION OPERATIONS ARE NOT ACTIVELY IN PROGRESS ON WORKING DAYS THE CONTRACTOR SHALL MAINTAIN ALL TRAVEL LANES OF THE ROADWAY. ANY DEVIATION OF THESE REQUIREMENTS SHALL BE IN ACCORDANCE WITH SECTION 7-10.3 OF THE STANDARD SPECIFICATIONS.

PLANS FOR THE PUBLIC IMPROVEMENTS IN AND ADJOINING
BEYER HILL ESTATES

CITY OF SAN DIEGO, CALIFORNIA
SHEET 1 OF 11 SHEETS

T.M. 77-215
W.O. NO 70772

C.E. Lockhard 12-4-78 DATE — Jim Myrtle 12-6-78

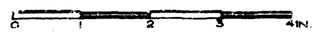
DESCRIPTION	BY	APPROVED	DATE	FILED
ORIGINAL				
AS BUILT	APEC			

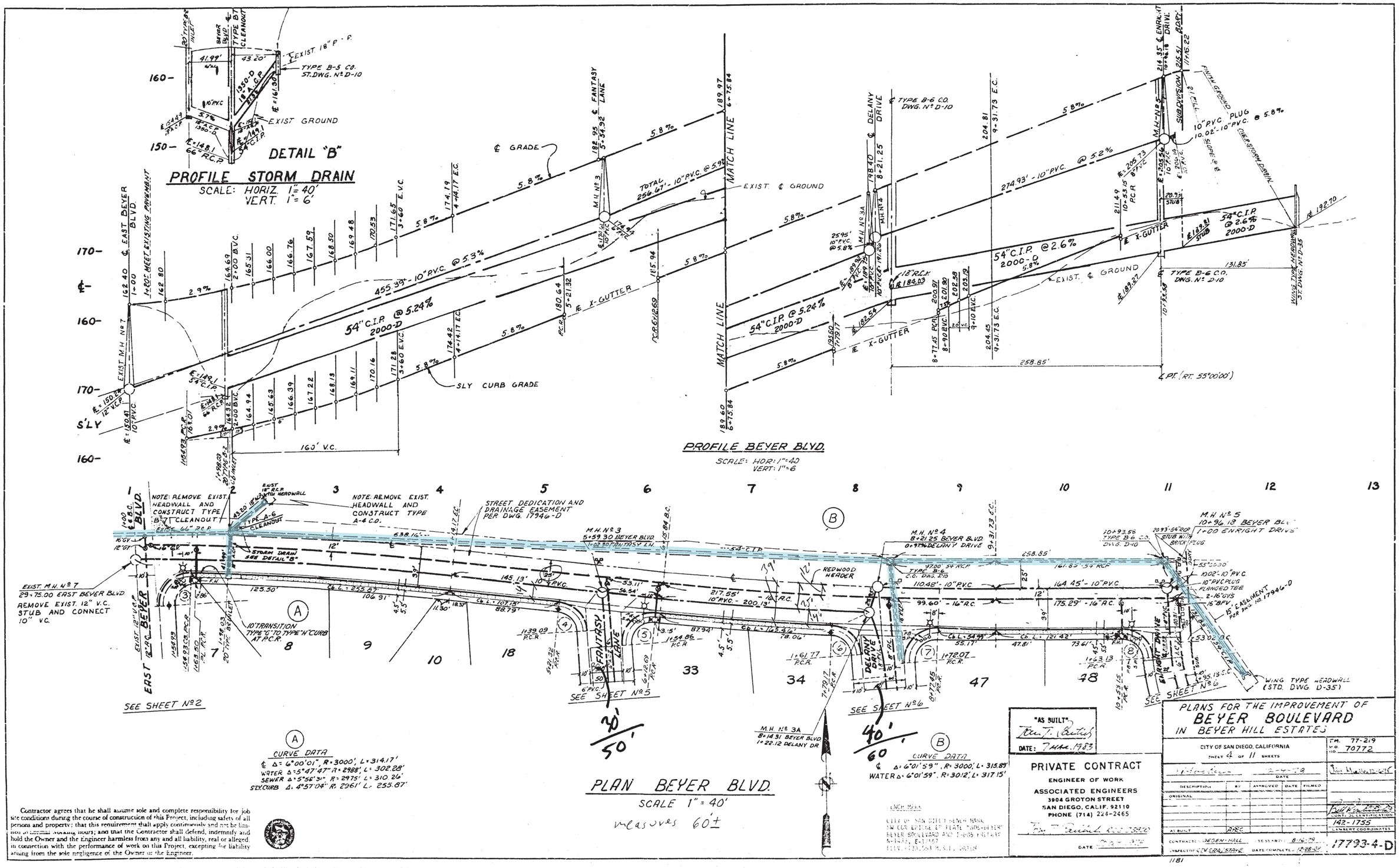
CONTROL 12-27-78
192-1755 LAMBERT COORD. RATES

CONTRACTOR GEN-HALL
INSPECTOR CE "ERA"/STATE
DATE STARTED 3-16-79
DATE COMPLETED 12-28-82

17793-1-D

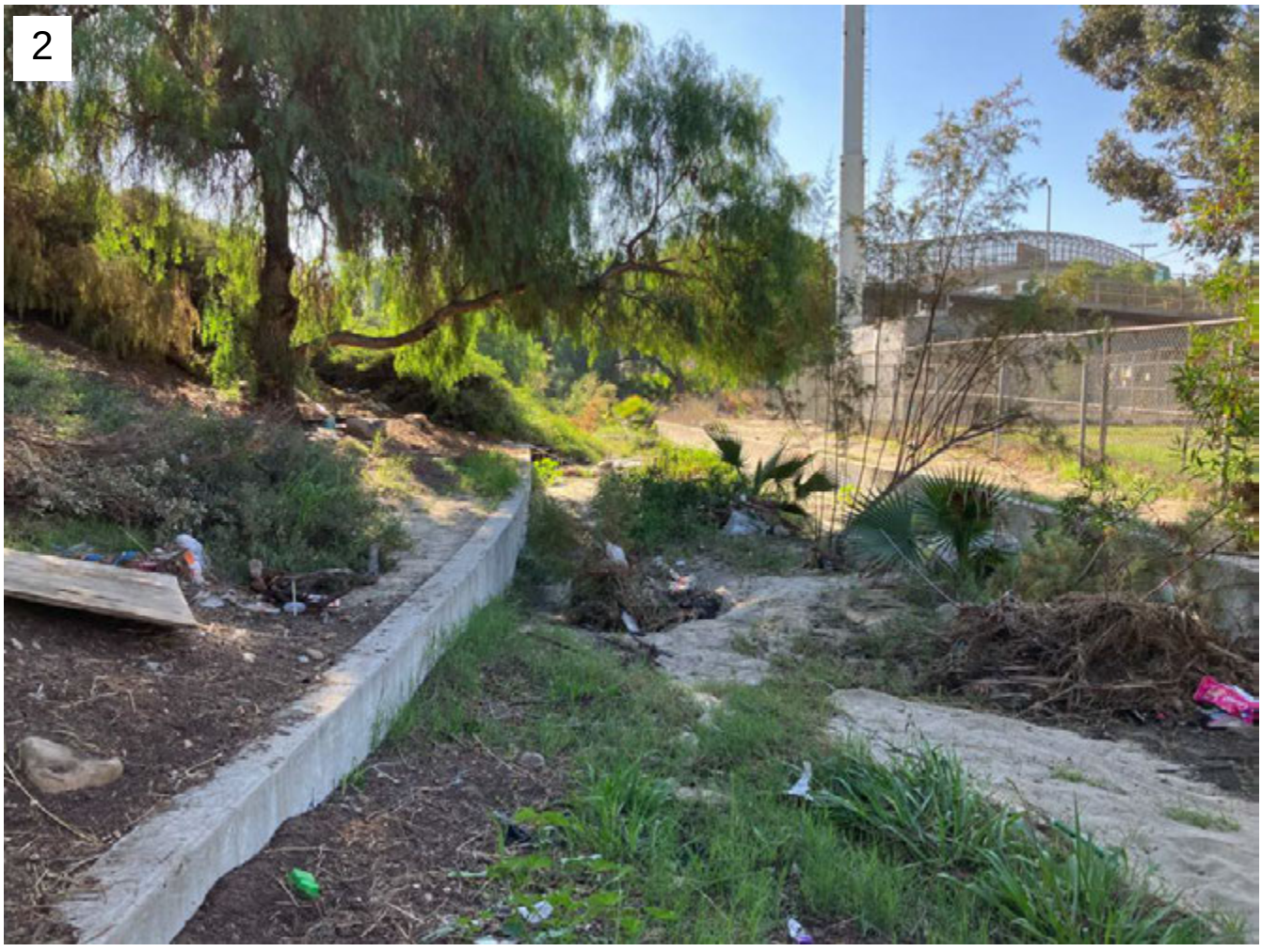
1134




DETAIL "B"
PROFILE STORM DRAIN
SCALE: HORIZ. 1"=40'
VERT. 1"=6'
EXIST. M.H. No 7
EAST BEYER BLVD.
MATCH LINE
EXIST. ℄ GROUND
℄ GRADE
FANTASY LANE
DELANY DRIVE
54" C.I.P. @ 5.24%
2000-D
455.39' - 10" P.V.C. @ 5.3%
54" C.I.P. @ 2.6%
2000-D
274.93' - 10" P.V.C. @ 5.2%
SLY CURB GRADE
PROFILE BEYER BLVD.
SCALE: HOR: 1"=40
VERT: 1"=6
NOTE: REMOVE EXIST. HEADWALL AND CONSTRUCT TYPE B-T CLEANOUT
NOTE: REMOVE EXIST. HEADWALL AND CONSTRUCT TYPE A-6 C.O.
STREET DEDICATION AND DRAINAGE EASEMENT PER DWG. 17946-D
EXIST. M.H. No 7 29+75.00 EAST BEYER BLVD
REMOVE EXIST. 12" V.C. STUB AND CONNECT 10" V.C.
10' TRANSITION TYPE 'G' TO TYPE 'H' CURB AT P.C.R.
SEE SHEET No 2
SEE SHEET No 5
SEE SHEET No 6
M.H. No 3A 8+14.31 BEYER BLVD 1+22.12 DELANY DR
M.H. No 4 8+21.25 BEYER BLVD 0+97.76 DELANY DRIVE
M.H. No 5 10+96.18 BEYER BLVD 1+00 ENRIGHT DRIVE
TYPE B-6 C.O. DWG. D-10
WING TYPE HEADWALL (STD. DWG. D-35)
15' EASEMENT PER DWG. NO. 17946-D
PLAN BEYER BLVD.
SCALE 1" = 40'
measures 60'±
CURVE DATA
℄ Δ= 6°00'01", R=3000', L=314.17'
WATER Δ=5°47'47" R=2988', L=302.28'
SEWER Δ=5°56'31" R=2975' L=310.26'
SLY CURB Δ=4°57'04" R=2961' L=255.87'
CURVE DATA
℄ Δ=6°01'59", R=3000', L=315.89'
WATER Δ=6°01'59", R=3012', L=317.15'
"AS BUILT"
DATE: MAR. 1983
PRIVATE CONTRACT
ENGINEER OF WORK
ASSOCIATED ENGINEERS
3904 GROTON STREET
SAN DIEGO, CALIF. 92110
PHONE (714) 224-2465
PLANS FOR THE IMPROVEMENT OF
BEYER BOULEVARD
IN BEYER HILL ESTATES
CITY OF SAN DIEGO, CALIFORNIA
SHEET 4 OF 11 SHEETS
T.M. 77-219
W.O. 70772
17793-4-D
Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this Project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineer harmless from any and all liability, real or alleged, in connection with the performance of work on this Project, excepting for liability arising from the sole negligence of the Owner or the Engineer.

1

2



3

4


5


6

7

8

Worksheet H.7-1: Domain of Analysis

Domain of Analysis		Worksheet H.7-1
Use this form to document the domain of analysis		
Project Name: Southwest Village Vesting Tentative Map		
Project Tracking Number / Permit Application Number: 614791		
Part 1: Identify Domain of Analysis		
Project Location (at proposed stormwater discharge point)		
1	Address:	
2	Latitude (decimal degrees):	32°32'44.03"N
3	Longitude (decimal degrees):	117° 0'46.23"W
4	Watershed:	Tijuana River
Basis for determining downstream limit: After discharging into Spring Canyon, flows are collected by a culvert that crosses under the international border into Mexico.		
Channel length from discharge point to downstream limit:		274-ft
Basis for determining upstream limit: Given the top width of the channel is 125-ft, the domain of analysis will extend upstream for ~2,500-ft (~20 times the top width of Spring Canyon at Outfall 9).		
Channel length from discharge point to upstream limit:		2500-ft

Worksheet H.7-1; Page 2 of 2

Photo(s)

Map or aerial photo of site. Include channel alignment and tributaries, project discharge point, upstream and downstream limits of analysis, ID number and boundaries of geomorphic channel units, and any other features used to determine limits (e.g. exempt water body, grade control).

Outfall 9 discharges to the bottom of Spring Canyon, which has a tributary watershed of approximately 2,200 acres. The channel throughout the domain of analysis is natural and well vegetated. In the post-project condition around 120 acres will be directed to this location before being conveyed by Spring Canyon to the downstream culvert that crosses the international border with Mexico.

C:\RICK\Projects\C_SD_J15013_South Otay Water Resources\Hydromodification\GCA\15013_Outfall9_gca02.mxd

RICK ENGINEERING COMPANY

Scale in Feet
0 200 400

North

Date of Exhibit: 3/9/2022
DigitalGlobe Aerial Image: 04.2013

15013C: Southwest Village

Geomorphic Channel Assessment

J-15013C

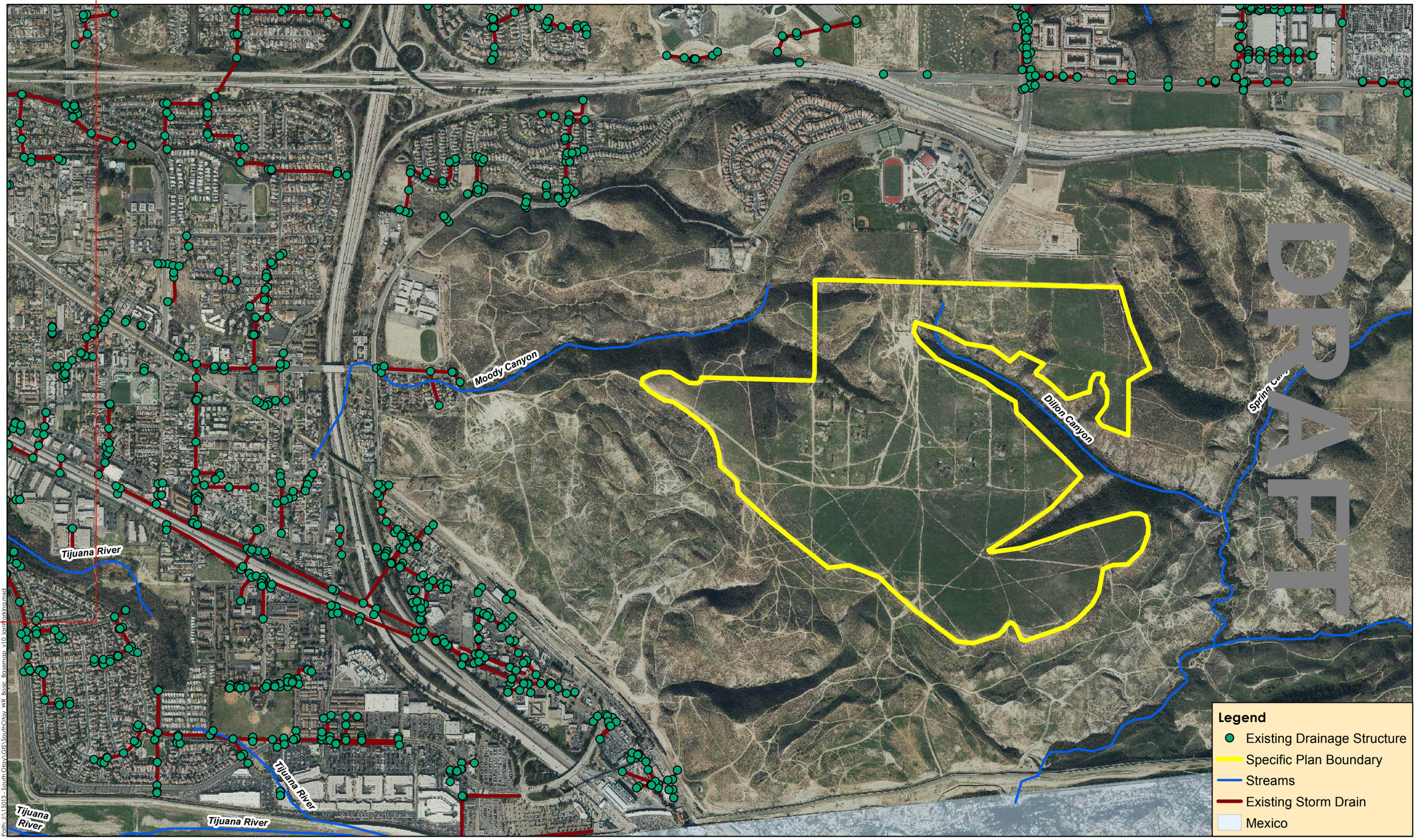

International Border
Spring Canyon
Culvert
15013C: Southwest Village
Photo taken: 4/15/2021
facing east


International Border
Approximate Location of Outfall 9
Spring Canyon
15013C: Southwest Village
Photo taken: 4/15/2021
facing east


International Border
Culvert
Spring Canyon
15013C: Southwest Village
Photo taken: 4/15/2021
facing south

APPENDIX D

Drainage and Water Quality Supporting Exhibits



Path: J:\15013 - South Otay\GIS\SouthOtay_WR_Basic_Basemap_v10_landscape.mxd

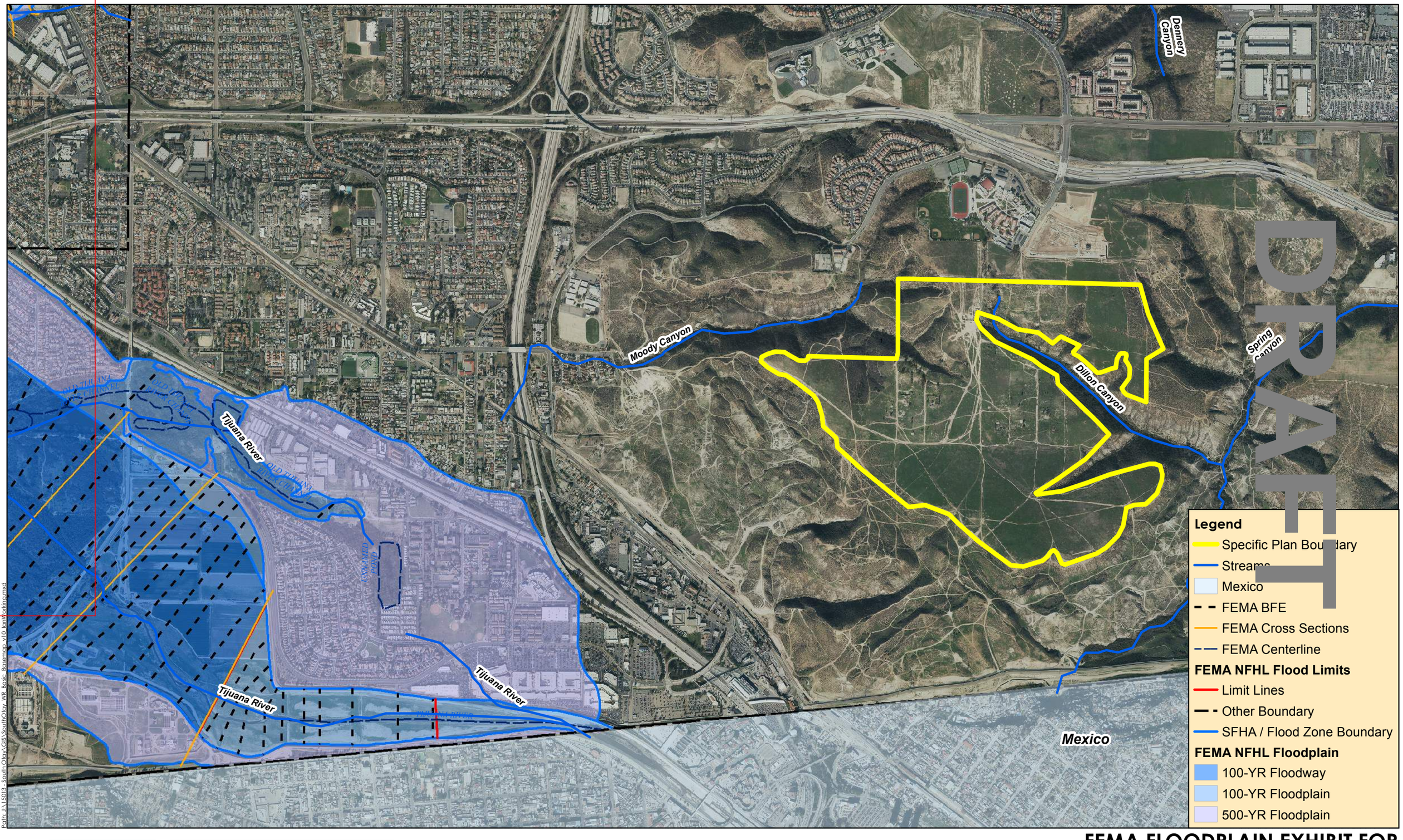
RICK ENGINEERING COMPANY

Scale in Feet
0 1,000 2,000
North

Date of Exhibit: 3/6/2018
SanGIS/USGS Aerial Imagery: 11/2014

EXISTING DRAINAGE INFRASTRUCTURE EXHIBIT FOR SOUTHWEST VILLAGE SPECIFIC PLAN

J-15013C



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RICK ENGINEERING COMPANY

Scale in Feet
0 1,250 2,500
North

Date of Exhibit: 3/6/2018
SanGIS/USGS Aerial Imagery: 11/2014

FEMA FLOODPLAIN EXHIBIT FOR SOUTHWEST VILLAGE SPECIFIC PLAN

J-15013C

910.2 Otay Valley

910.2 Otay Valley

Dennery Canyon

911.11 San Ysidro

Moody Canyon

911.12 Water Tanks

Spring Canyon

Dillon Canyon

Tijuana River

Tijuana River

Tijuana River

Mexico

Legend

- General Flow Path
- Specific Plan Boundary
- Streams
- Mexico
- Hydrologic Unit Boundary

Path: J:\15013 - South Otay\GIS\SouthOtay_WR_Basic_Basemap_v10.tpk\Working.mxd

RICK ENGINEERING COMPANY

Scale in Feet

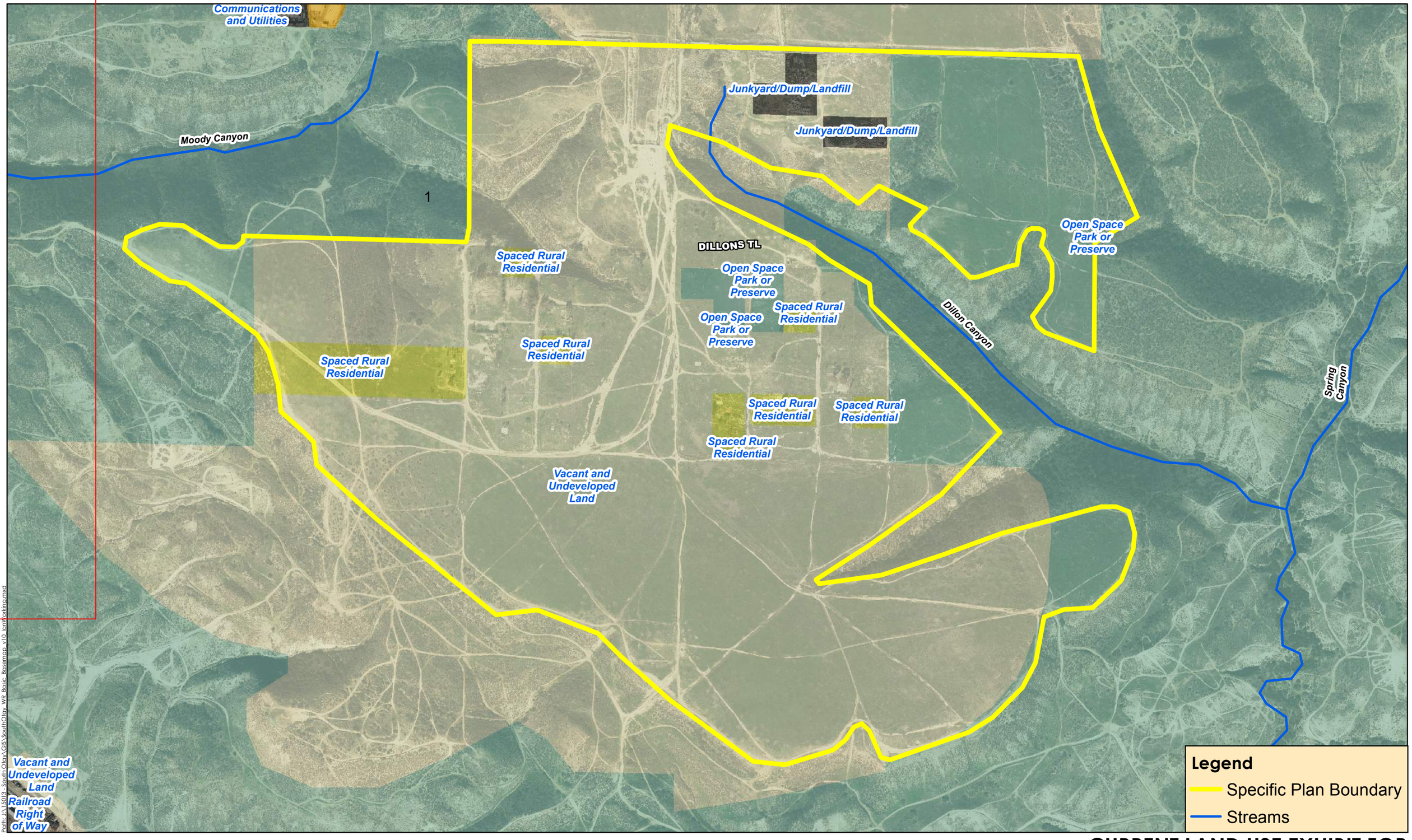
0 1,250 2,500

North

Date of Exhibit: 3/6/2018
SanGIS/USGS Aerial Imagery: 11/2014

HYDROLOGIC UNIT EXHIBIT FOR SOUTHWEST VILLAGE SPECIFIC PLAN

J-15013C



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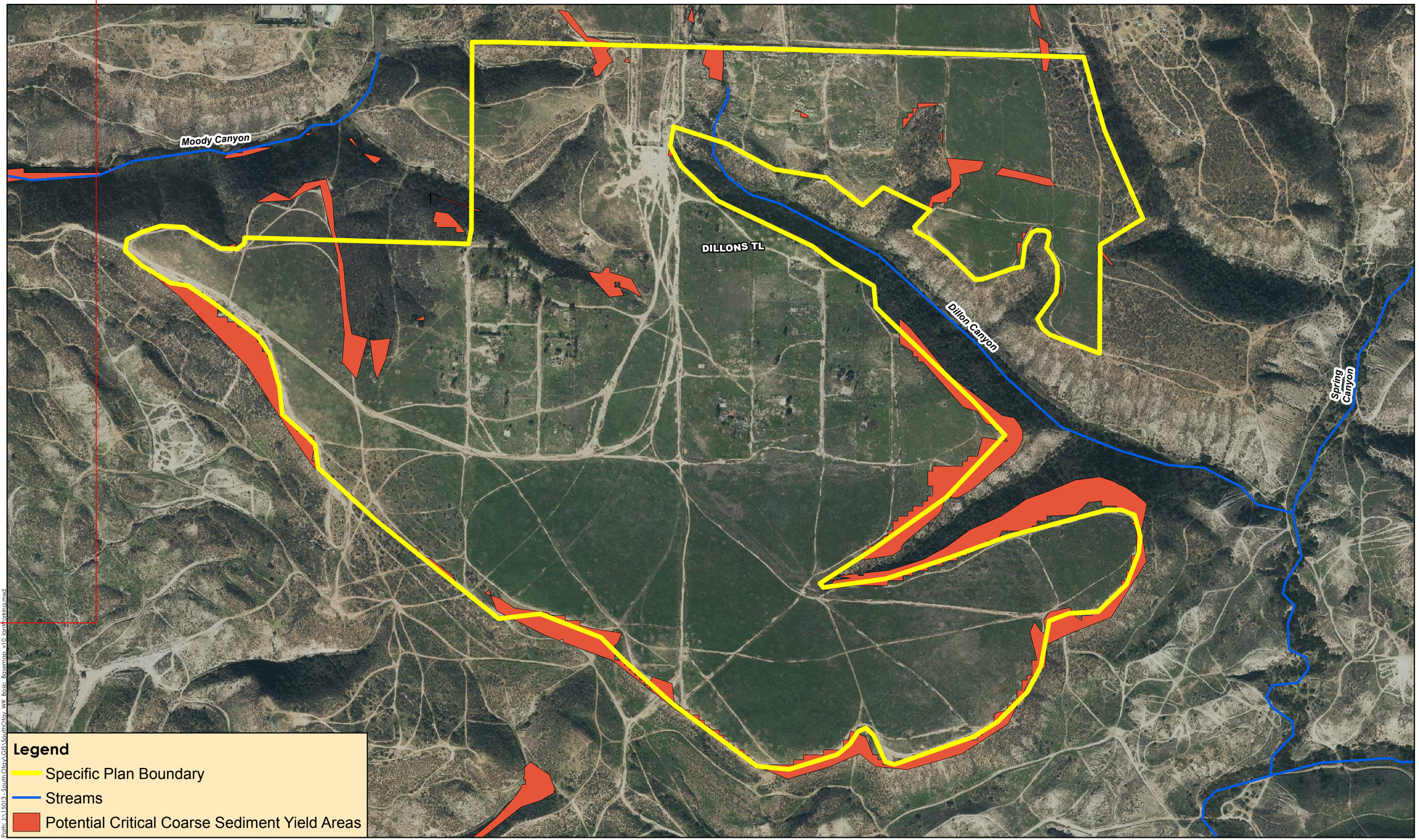
RICK ENGINEERING COMPANY

Scale in Feet
0 500 1,000
North

Date of Exhibit: 3/6/2018
SanGIS/USGS Aerial Imagery: 11/2014

CURRENT LAND USE EXHIBIT FOR SOUTHWEST VILLAGE SPECIFIC PLAN

J-15013C



Path: J:\15013 - South Otay\GIS\SouthOtay_WR_Basis_Basemap_v10.lyrx\Arkine.mxd

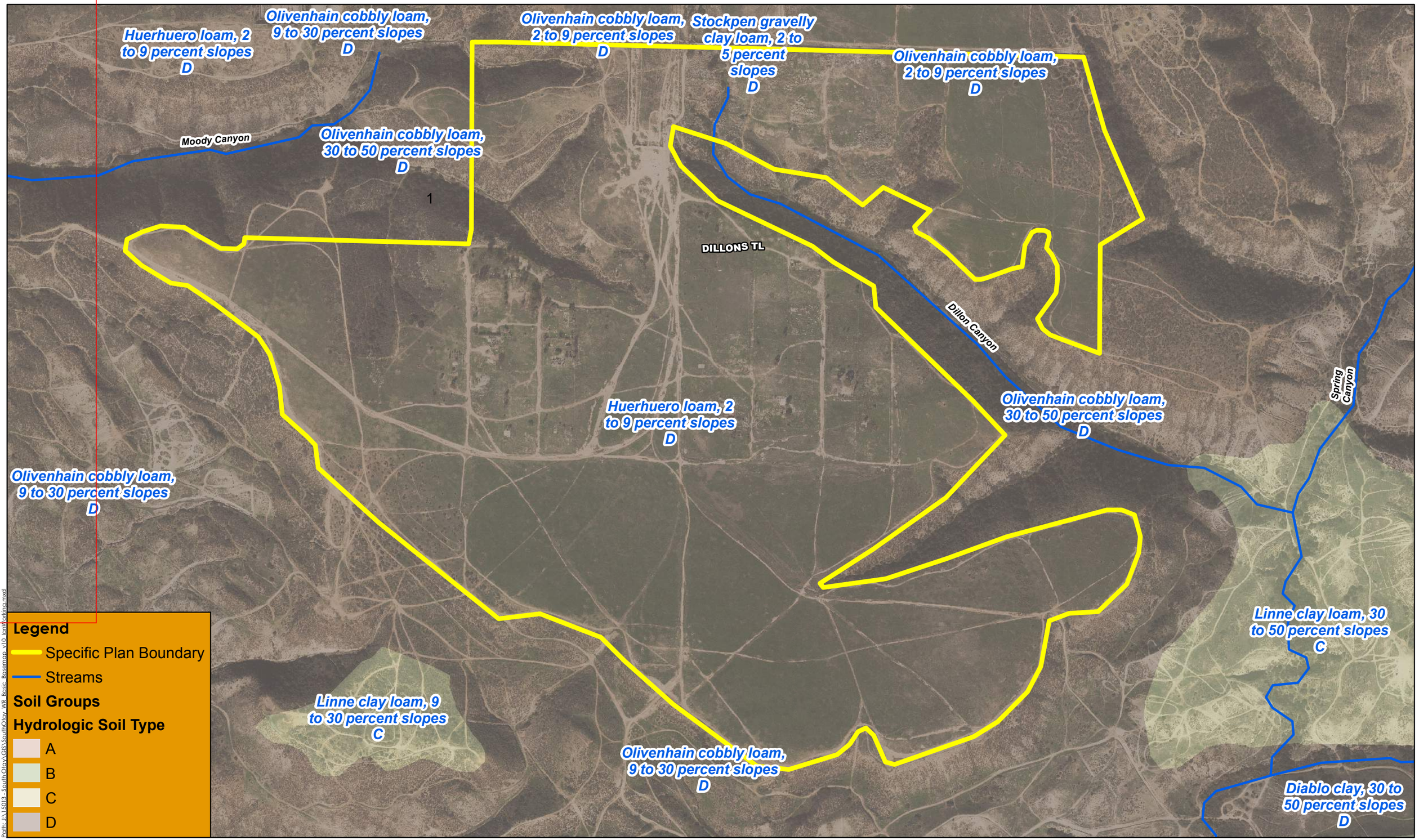
RICK ENGINEERING COMPANY

Scale in Feet
0 500 1,000
North

Date of Exhibit: 3/6/2018
SanGIS/USGS Aerial Imagery: 11/2014

POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREA EXHIBIT FOR SOUTHWEST VILLAGE SPECIFIC PLAN

J-15013C



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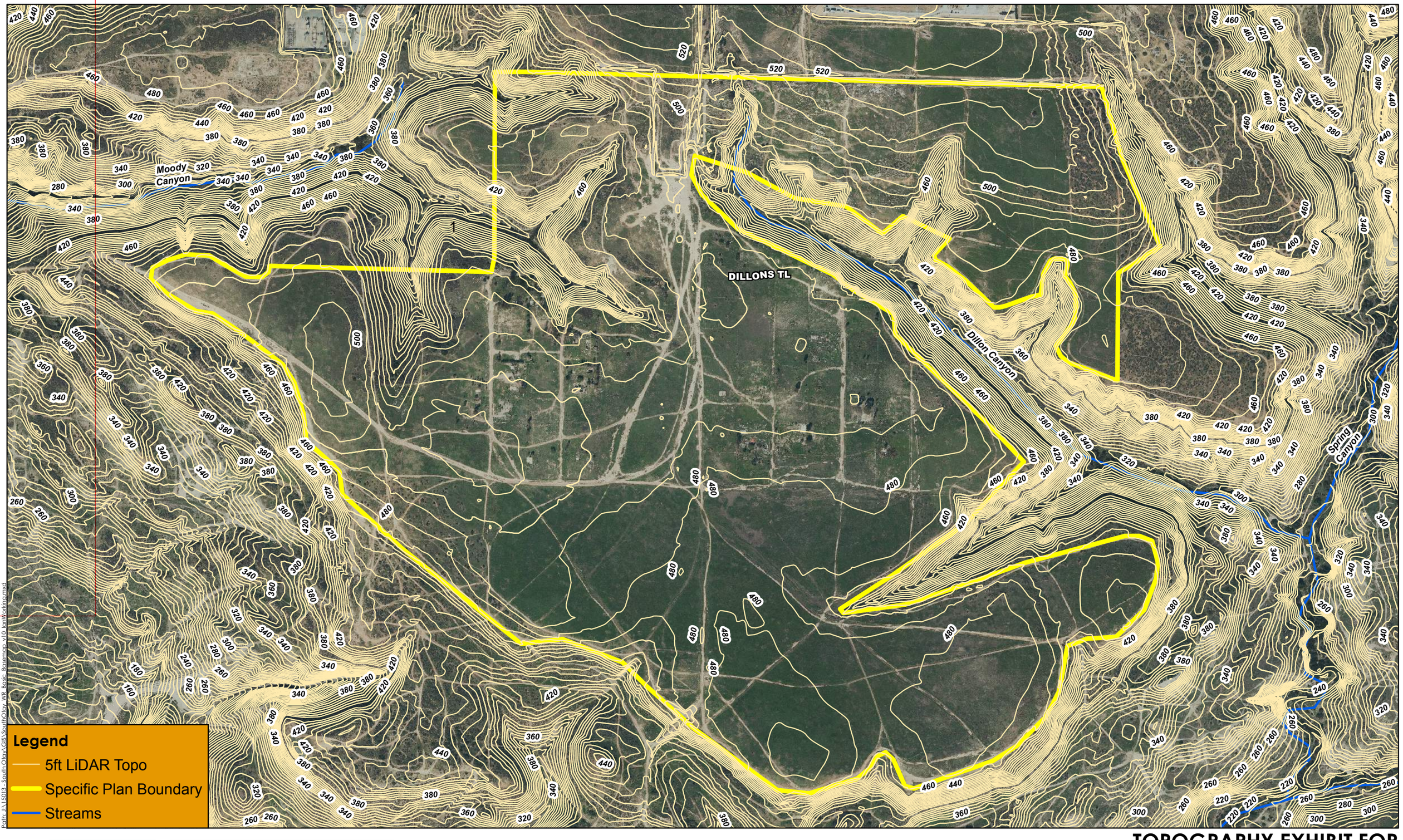
RICK ENGINEERING COMPANY

Scale in Feet
0 500 1,000
North

Date of Exhibit: 3/6/2018
SanGIS/USGS Aerial Imagery: 11/2014

HYDROLOGIC SOIL GROUPS EXHIBIT FOR SOUTHWEST VILLAGE SPECIFIC PLAN

J-15013C



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RICK ENGINEERING COMPANY

Scale in Feet
0 500 1,000
North

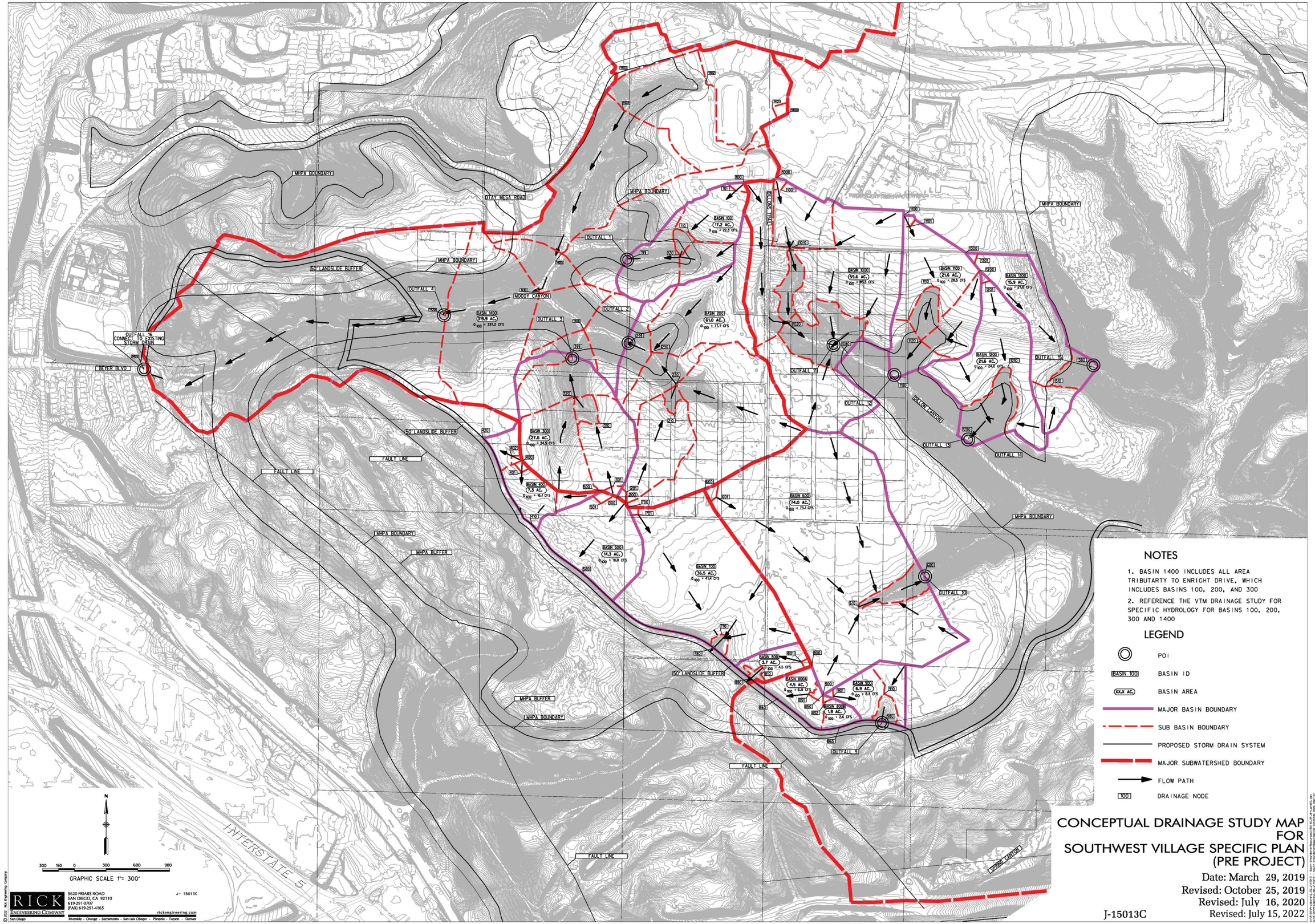
Date of Exhibit: 3/6/2018
SanGIS/USGS Aerial Imagery: 11/2014

TOPOGRAPHY EXHIBIT FOR SOUTHWEST VILLAGE SPECIFIC PLAN

J-15013C

MAP POCKET 1

Conceptual Drainage Study Map
for
Southwest Village Specific Plan
[Pre-project]



NOTES

1. BASIN 1400 INCLUDES ALL AREA TRIBUTARTY TO ENRIGHT DRIVE, WHICH INCLUDES BASINS 100, 200, AND 300
2. REFERENCE THE VTM DRAINAGE STUDY FOR SPECIFIC HYDROLOGY FOR BASINS 100, 200, 300 AND 1400

LEGEND

- POI
- [BASIN 100] BASIN ID
- [XX.X AC.] BASIN AREA
- MAJOR BASIN BOUNDARY
- SUB BASIN BOUNDARY
- PROPOSED STORM DRAIN SYSTEM
- MAJOR SUBWATERSHED BOUNDARY
- FLOW PATH
- [100] DRAINAGE NODE

CONCEPTUAL DRAINAGE STUDY MAP FOR SOUTHWEST VILLAGE SPECIFIC PLAN (PRE PROJECT)

Date: March 29, 2019
Revised: October 25, 2019
Revised: July 16, 2020
Revised: July 15, 2022

J-15013C

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619.291.0707
(FAX) 619.291.4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver
J- 15013C

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

MAP POCKET 2

Conceptual Drainage Study Map
for
Southwest Village Specific Plan
[Post-project]

	Pre-Project Condition			Post Project Condition		
Basin ID	Area (ac)	Tc (min)	Q100 (cfs)	Area (ac)	Tc (min)	Q100 (cfs)
100	17.2	15.3	22.3	16.5	12.9	29.8
200	61	15.9	77.7	60.7	14.4	158
300	27.6	15	36.1	39.5	10.3	110.0
400	7.3	13.8	9.8	-	-	-
500	14.3	16.3	18.0	-	-	-
600	74.0	18.7	76.1	67.0	19.5	134.6
700	36.5	16.7	41.4	-	-	-
800	3.7	14.3	4.5	-	-	-
800A	4.5	12	6.0	-	-	-
800B	1.9	11.6	2.6	-	-	-
900	6.9	14.5	8.4	53.0	24.9	99.3
1000	59.6	13.4	85.3	49.7	13.2	117.8
1100	21.6	16.2	28.5	18.4	11.0	47.0
1200	21.6	21.7	24.0	28.3	11.2	74.9
1300	15.9	15.5	21.0	21.1	20.1	39.5
1400	319.9	24.2	337	346	22.9	429.0

NOTES: IN THE POST-PROJECT CONDITION, FLOWS THAT WERE TRIBUTARY TO THE LANDSLIDE COMPLEX TO THE WEST HAVE BEEN DIVERTED EITHER TO THE NORTH AND WILL BE PIPED DOWN THE FUTURE BEYER BOULEVARD OR TO SPRING CANYON TO THE SOUTH.

MOODY CANYON
OVERALL WATERSHED AREA = 320 AC
PRE-PROJECT AREA = 320 AC
POST-PROJECT AREA = 346 AC
DIVERTED AREA = 26 AC
Q100 PRE = 337 CFS
Q100 POST = 429 CFS
Q100 POST DETAINED <= 337 CFS

SPRING CANYON
OVERALL WATERSHED AREA = 2,200 AC
PRE-PROJECT AREA = 91 AC
POST-PROJECT AREA = 90 AC
DIVERTED AREA = 29 AC
Q100 PRE = 117 CFS
Q100 POST = 334 CFS
Q100 POST DETAINED <= 117 CFS
NOTE: AREA AND Q100 FLOW RATES ARE BASED ON CONTRIBUTIONS FROM BASINS 500, 600, AND 900 AND DOES NOT INCLUDE THE TOTAL TRIBUTARY AREA WITHIN SPRING CANYON OR OTHER PROJECT AREAS.

FINGER CANYON (BASIN 600)
PRE-PROJECT AREA = 74.0 AC
POST-PROJECT AREA = 67.0 AC
Q100 PRE = 94.6 CFS
Q100 POST = 134.6 CFS
Q100 POST DETAINED <= 94.6 CFS

OUTFALL 9
PRE-PROJECT AREA = 17 AC
POST-PROJECT AREA = 53 AC
DIVERTED AREA = 36 AC
Q100 PRE = 24.5 CFS
Q100 POST = 193 CFS
Q100 POST DETAINED <= 21.5 CFS
NOTE: AREA AND FLOWS ARE LIMITED TO WHAT IS BEING CONTRIBUTED FROM THE PROJECT SITE.

NOTE: OUTFALL STRUCTURE TO BE CONCRETE ENERGY DISSIPATOR CONSISTENT WITH CITY OF SAN DIEGO STANDARD DRAWING SDD-105

NOTES

1. BASIN 1400 INCLUDES ALL AREA TRIBUTARTY TO ENRIGHT DRIVE, WHICH INCLUDES BASINS 100, 200, AND 300
2. REFERENCE THE VTM DRAINAGE STUDY FOR SPECIFIC HYDROLOGY FOR BASINS 100, 200, 300 AND 1400

LEGEND

- POI
- BASIN 100 — BASIN ID
- XX.X AC. — BASIN AREA
- MAJOR BASIN BOUNDARY
- SUB BASIN BOUNDARY
- PROPOSED STORM DRAIN SYSTEM
- FLOW PATH
- 100 — DRAINAGE NODE

GRAPHIC SCALE 1"= 300'

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CONCEPTUAL DRAINAGE STUDY MAP FOR SOUTHWEST VILLAGE SPECIFIC PLAN (POST PROJECT)

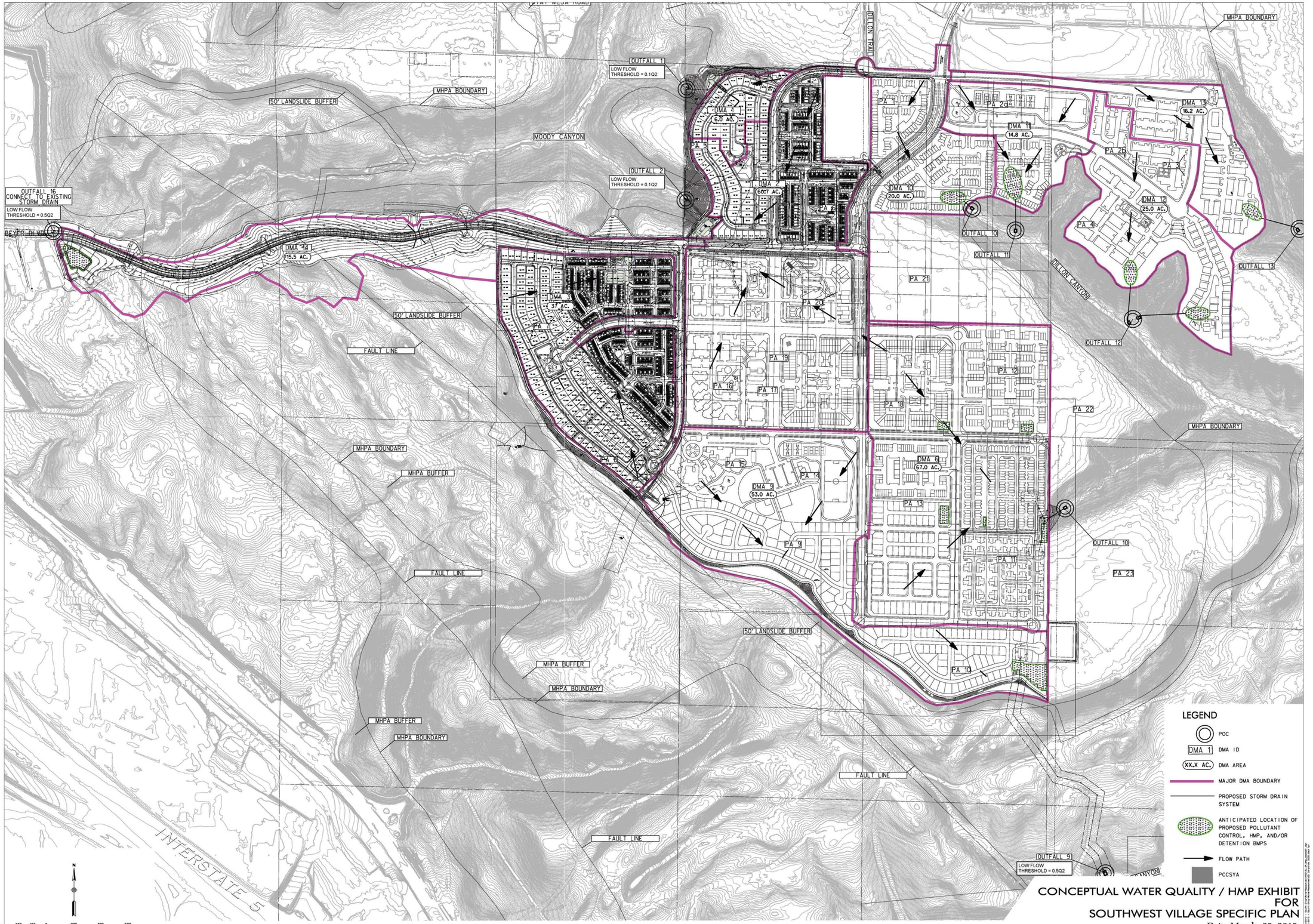
Date: March 29, 2019
Revised: October 25, 2019
Revised: July 16, 2020
Revised: March 14, 2022
Revised: April 19, 2023

J-15013C

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

MAP POCKET 3

Conceptual Water Quality / HMP Exhibit
for
Southwest Village Specific Plan



LEGEND

- POC
- DMA 1 — DMA ID
- XX.X AC. — DMA AREA
- MAJOR DMA BOUNDARY
- PROPOSED STORM DRAIN SYSTEM
- ANTICIPATED LOCATION OF PROPOSED POLLUTANT CONTROL, HMP, AND/OR DETENTION BMPS
- FLOW PATH
- PCCSYA

GRAPHIC SCALE 1" = 200'

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CONCEPTUAL WATER QUALITY / HMP EXHIBIT FOR SOUTHWEST VILLAGE SPECIFIC PLAN

J-15013C

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